

# Participatory Linguistic Evidence

A Preliminary Study of Inquiry Episodes

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## Abstract

Participation can improve linguistic inquiry by changing what an investigator can notice, ask, interpret and contest. The encounter producing that improvement can also alter the responses, distinctions and relations being investigated. This paper examines the evidential warrant of a bounded inquiry episode within a Generative Relational framework. Its central distinction connects successful coordination, acquired interpretive access and the attribution supported by the resulting evidence. A comparison of elicitation, interactional analysis, transcription and collaborative research grounds an account of inquiry that retains participant correction and productive disagreement. Historical carriers distinguish an earlier target from its current manifestation and from the investigator's revised description. A partial-history operator representation specifies which later readouts remain transportable through earlier records; a selected query can remain recoverable even when a whole later classification cannot. A nonlinear regional field model then investigates inquiry-induced response change, the persistence of a newly elicited regime and the difference between exact dynamical injectivity and finite-resolution discrimination. The field coordinates have a stipulated task interpretation and do not measure understanding. A developed constructed case compares successful reinterpretation, newly formed shared use, lost record distinctions and unresolved antecedent attribution. The resulting reporting architecture makes the history of interpretation available for criticism without requiring an exhaustive record or treating additional inquiry as an entitlement. The contribution is a scoped philosophical and formal investigation of evidential relations, with inherited identification and criterion-comparison results made explicit; it supplies neither a validated fieldwork protocol nor a general theory of linguistic knowledge.

**Keywords:** linguistic evidence; participatory inquiry; interpretive learning; historical warrant; nonlinear fields; observable algebras

## Scope And Reading Note

This preliminary discussion manuscript investigates the warrant of evidence produced in selected linguistic inquiry episodes. It is intended for sustained criticism and further development. The philosophical constructions, comparisons and illustrative models are proposals whose interpretation requires assessment alongside their formal properties.

The investigation inherits Generative Relational distinctions among a history-bearing formation, its manifestations and its mathematical representations. It also inherits prior work on interpretive uptake, criterion revision, reconstruction and capacity attribution. Explicit identification of that inheritance limits the novelty claim. The present focus is the relation between changing interpretive access and the historical reach of an evidential attribution.

The field and operator investigations are several possible representations. Their exact statements hold under their declared assumptions. No scalar measure of meaning, empirical model of a speech community, quantum account of cognition or universal observation procedure is proposed. The constructed inquiry contains fictional participants and stipulated events. It supports comparison of inferences, not findings about an actual community.

Readers can assess the philosophical account and the mathematical models separately, while examining the interpretive connections the paper proposes between them. Computational checks and reproducible figure sources accompany the manuscript. Their finite scope does not replace the proofs or establish empirical validity.

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## Notices

**Status.** This discussion draft presents an evolving inquiry. The definitions, translations, formal constructions, empirical interpretations, and conclusions remain open to criticism and author review. It investigates selected inquiry episodes and proposes no universal test of understanding, empirically calibrated field law or entitlement to obtain participation.

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**Statement On The Use Of Language Models.** The author selected the research direction, supplied prior manuscripts and a reference exposition, and requested consistency with the Generative Relational research programme. AI-assisted research, source comparison, drafting, formal checking, and document preparation contributed substantially to this draft. These contributions include proposed arguments and interpretations that remain subject to the author's review. Preparation of a checked draft does not establish the author's approval of every claim. Authorship credit remains with the human author; the use of these tools is disclosed to support critical assessment of the manuscript and its limitations.

# 1 Introduction

An investigator can preserve an utterance accurately while misunderstanding what its participants are doing. Later participation may teach the investigator to hear a qualification, recognize an indirect challenge, or distinguish a completed action from an authorized one. The earlier record then becomes evidence for a question that the investigator could not previously formulate well. A different encounter can produce an equally convincing later understanding by introducing a new convention, supplying an answer, or reorganizing the practice. These possibilities make the history of inquiry relevant to the claim supported by its result. The problem is to explain how participation can improve evidential warrant while keeping the transformations through which that improvement occurs available for criticism.

The analytical object of this paper is a bounded linguistic inquiry episode. An episode includes selected earlier events, the investigator's entry and changing practical competence, participants' contributions, the questions and materials introduced, the resulting records, and the claim made from them. Its boundary is selected by the inquiry rather than given by a universal definition of a linguistic community. A single episode can connect several persons and artifacts, extend across occasions, and leave some relevant history unavailable. Specifying that object permits a developed investigation of evidential relations without undertaking a general theory of knowledge or all forms of language preservation.

## 1.1 Successful Encounters

Consider a fictional documentation workshop in which an investigator initially treats an editor's objection to a caption as a correction of factual content. The editor accepts one accurate statement and rejects another that appears equally well supported. Through examples and shared work, the investigator learns to distinguish a speaker's testimony from an editor's inference, including cases in which both are factually plausible. The group subsequently agrees on a caption for the recording. At least three achievements are possible: a workable caption, an investigator who now discriminates the relevant situations, and a warranted description of how the expression functioned before the workshop. Their evidential requirements overlap while remaining distinct.

The caption can be useful even if it expresses a negotiated translation rather than a pre-existing explicit definition. The investigator can acquire a practical discrimination even if the initial recording remains too coarse to show whether it applied in that earlier occurrence. Conversely, the recording can contain a decisive contrast whose significance becomes clear only after the investigator's later learning. A successful encounter therefore needs an interpretation of its success. Agreement, increased fluency and the production of a reusable record provide evidence of different aspects of the episode; none has a fixed evidential meaning independently of the question being asked.

The positive opportunity is substantial. An investigator's participation may reveal which distinctions organize the activity, which proposed examples misstate the situation, and which responses require supports that an interview format removes. Participants can correct the investigative question itself. The resulting change in access can make a better explanation possible. The same openness makes it important to preserve the earlier question and the grounds for its revision. Otherwise the final report can present a newly negotiated distinction as if it had simply been read from an unchanged record.

## 1.2 Historical Attribution

The inquiry distinguishes an attribution to an earlier event from an attribution to present participants or to the newly formed relation. The distinction is inherited from the prior investigation of interpretive uptake, which separates earlier interpretation, current interpretation and a capacity across a declared range of occasions [11, Section 7]. The present paper takes that distinction as a starting point. It examines how the investigator's own interpretive change alters the evidential relation, including cases where the words of the retained record remain unchanged.

A historical claim can be supported without replaying the past. It can draw on ordered records, testimony, recurring contrasts and consequences that favor one account over another. Its warrant depends

on the relation between those materials and the selected earlier target. Later evidence can strengthen that relation, but the fact that an encounter now works cannot carry it by itself. A participant may have learned during the encounter; the investigator may have changed the task; or the parties may have created a comparison that neither previously used in the same way.

Historical attribution also differs from a contemporary analyst's classification. An earlier action can satisfy a presently articulated description without its participants having used that description. A participant can have made a practical distinction without possessing the investigator's later terminology for it. The paper retains these possibilities because each can support a legitimate but differently scoped claim. Requiring identical vocabulary would make practical understanding unnecessarily dependent on retrospective explicitness; ignoring the difference would encourage projection.

### 1.3 Generative Relational Inheritance

The Generative Relational framework supplies a way to place the investigator, participants, records and interpretive standards within a historically extended relational formation. The represented object is ordinarily a spacetime of events and relations, with selected continuities and transformations. A labelled two-complex can represent its incidence structure. A spin foam would require further mathematical data and is not supplied merely by naming the complex. The framework's ontological suspension leaves the ultimate status of such representations open.

Several essential distinctions already have substantial treatment in the author's manuscripts. The preservation taxonomy separates structural comparison, historical provenance, identification and valuation [8, Sections 3, 13]. The reconstruction paper distinguishes a present generative achievement from recovery of a particular earlier organization [10]. The criterion-comparison paper establishes that new classifications can refine, replace or merely rename old distinctions, and specifies the retained information required by a later revision [9, Sections 4–8]. These are inherited resources, not contributions first established here.

The investigation of dormant linguistic capacities further shows why testing histories matter to a claim that present success reveals antecedent organization [12, Sections 6–8]. The current paper changes the analytical center. It asks how the investigator's access and the episode's record-making practices enter the warrant, including the reinterpretation of an archive, a revised question, or a participant's challenge to the code. This focus links epistemic and practical analysis while leaving a separately evaluated documentation protocol to further work.

### 1.4 Analytical Architecture

The philosophical account develops five connected requirements: a specified target, an account of access, a history of relevant transformations, comparison with substantive alternatives, and grounds for revising the claim. These requirements do not constitute a mechanical validity checklist. Each names a relation that must be defended in the particular inquiry. A record can identify the selected fact while other histories remain unknown; participation can improve an interpretation while leaving the earlier target unresolved.

The first formal investigation treats selected history records and partial inquiry operations through observable and operation algebras. It distinguishes a preserved historical anchor from access to that anchor. It also identifies a restricted class of later readouts that can be supported by an earlier record even when the complete later classification cannot be transported through it. The result is a model-relative specification of what the record retains. Its linguistic interpretation and the practical availability of its readouts remain additional obligations.

The second formal investigation constructs a nonlinear response field on a regional interface graph. Inquiry enters as a declared input history. The selected law permits an elicitation pulse to move a response channel into a regime that persists after prompting ends. The calculation clarifies why durable later success need not establish earlier possession of the same response disposition. A further estimate separates exact finite-time dynamical distinguishability from discrimination at finite observational resolution. The variables are stipulated response-channel amplitudes; the field does not define or measure

understanding.

The formal constructions perform different tasks. The algebra locates the information and transport conditions of a declared comparison. The field makes one possible intervention mechanism explicit. Neither supplies an empirical interpretation automatically, and neither is proposed as an exhaustive formalism for the research programme. Their connection is tested through the developed inquiry comparison and the reporting architecture later in the paper.

## 1.5 Evidential Scope

The next sections compare relevant research traditions, establish the philosophical account of encounter warrant, and examine interpretive learning. Historical carriers then support the algebraic and field investigations. A constructed documentation episode applies those distinctions to successive decisions about what can be claimed. Participant correction and broader objections constrain the account before its reporting implications are developed.

The manuscript reports no new participant study. Published research enters at its stated evidential scope, the workshop is a constructed comparison, and computational checks concern specified mathematical examples. A successful formal identification can justify a conditional claim inside its model while leaving the model's coverage and the interpretation of its target disputed. Conversely, an incomplete model does not make a well-supported historical or interpretive argument worthless. The objective is to keep the several grounds of a warranted claim visible and mutually answerable.

## 2 Linguistic Evidence Traditions

Established linguistic research provides several accounts of the relation between an encounter and its evidential product. This section positions the present investigation through a selective comparison of judgment research, interactional analysis, transcription studies, collaborative fieldwork and enactive social cognition. The comparison concerns the question each approach enables an investigator to ask, the access on which its answer depends and the limits of translating its result into another kind of claim. These approaches supply substantive antecedents for participatory inquiry. The present paper develops a particular problem of historical warrant within that existing methodological landscape.

### 2.1 Elicited Judgments

Judgment research supplies an important distinction between a response and its theoretical interpretation. Schütze and Sprouse treat acceptability judgments as reported behavioral reactions, distinguish acceptability from grammatical structure and explain why interpretation requires an account of the judgment task. Their discussion presents several readings of participant variation and cautions against inferring the character of grammar directly from a response scale or statistical result [15]. The methodological issue is therefore already richer than a choice between accepting speakers' answers literally and dismissing elicitation as artificial.

For the present inquiry, the advantage of elicitation is its capacity to organize a contrast that might otherwise remain unavailable. A question can direct attention, make alternatives comparable and invite a response whose relation to those alternatives is explicit. These changes can improve access. Their occurrence gives the investigator something to explain about the evidential process; it supplies no general reason to disqualify the resulting evidence. A request to compare two expressions can create a new occasion for judgment while drawing on a distinction the participant already uses. Equally, an explanation accompanying that request can introduce the distinction being tested. The identity of the requested response alone leaves these histories open.

Sprouse, Schütze and Almeida provide an empirical counterweight to general skepticism about elicitation. Their study of sampled US-English acceptability contrasts reports a preferred convergence estimate of 95%, with a margin of 5.3–5.8%, between published informal judgments and a selected formal

task and analysis. Other task combinations produced different estimates. The authors expressly distinguish methodological convergence from correctness and from a grammatical explanation of the contrast [16, pp. 219–222, 230–231, 235–236].

The comparison illustrates two questions that this paper keeps separate. One concerns whether different procedures reproduce a selected contrast. Another concerns what the contrast establishes about its proposed source. Reproduction can strengthen confidence that an effect deserves explanation while leaving its explanation disputed. A common response across procedures can reflect a retained capacity, a recurrent task interpretation or a shared background condition. Determining which account matters requires inquiry specific to the proposed attribution. Consequently, a claim about an earlier participant's understanding needs more than a demonstration that a later response is reproducible.

This distinction also protects the positive value of a modest result. An investigation may establish that participants reliably differentiate the supplied alternatives under described conditions. That finding can be useful even when it leaves the origin of the differentiation unresolved. The investigator need not redescribe the result as a failure simply because a stronger historical or theoretical interpretation remains unestablished. Stating the selected contrast and its conditions permits later work to examine the additional inference.

## 2.2 Interactional Organization

Interactional analysis directs attention to the sequential and embodied organization through which an action becomes interpretable. Schegloff's account identifies recurrent opportunities for participants to display understandings, recognize trouble and attempt repair, including circumstances in which these resources fail [14]. Goodwin develops an account of contextual configurations assembled through heterogeneous semiotic resources. In his archaeological example, moving a soil sample relative to a color chart changes the comparison available to participants. He also allows substantial understanding while some relevant fields remain opaque [4, pp. 1508–1515].

These accounts motivate a question about the unit of evidence. An isolated answer may omit the activity that made the answer possible, the proposal to which it responded or the correction that changed its significance. Expanding the unit to an episode can recover such relations. The expansion should have an analytical reason: the added material must bear on the action or attribution being examined. A longer record does not acquire greater relevance merely through duration, and a demand to include everything would make the evidential task indefinite.

For example, a response following a pause can invite competing descriptions. It may follow hesitation about an answer, work needed to make a comparison possible, an unsuccessful hearing or negotiation over the question. These possibilities are introduced here as analytical alternatives for the present inquiry, rather than as a universal classification of pauses. Choosing among them requires evidence appropriate to the particular sequence. Duration alone would be insufficient because the same elapsed interval can belong to different activities. A record that preserves what participants were doing can change the comparison available to the analyst.

Repair likewise has a double relevance. It can make an earlier misunderstanding visible and can change the understanding available afterward. An inquiry that records only the repaired outcome risks losing evidence of both developments. Yet the availability of a repair sequence does not establish that every misunderstanding has been found. The investigator should examine what was corrected and what the subsequent conduct supports. Continuing coordination can warrant a claim about the continuation while leaving other interpretations unsettled.

The present historical representations therefore take sequential relations seriously without treating a transcript as the complete object. Their purpose is to specify which dependencies the claim requires. Goodwin's semiotic fields retain their meaning within his analysis; the mathematical fields introduced later require separately defined variables, domains and dynamics. A shared word does not establish a formal translation between the two.

## 2.3 Transcription Decisions

The production of records introduces a further level of inquiry. Bucholtz distinguishes interpretive choices concerning what a transcript includes from representational choices concerning its written form. Her analysis recommends returning to recordings and seeking alternative hearings, including those of recorded speakers. It also recognizes that reflexive discussion can displace analysis or protect an interpretation from criticism [1, pp. 1439–1443, 1461–1463]. Reflexivity thus carries a demand for answerability rather than a guarantee that an account has become adequate.

The implication developed here concerns the temporal relation among an event, its retained material and its later description. An investigator can change a transcript after learning to distinguish features already present in a recording. In that situation the revised description has a new history, while the recorded event remains earlier. The revision may improve access to the earlier event if the retained material supports the new distinction. It may instead impose a distinction that the material cannot discriminate. Separating these possibilities requires comparison between the record and the claim, together with an account of the interpretation.

This structure permits productive inquiry through archives and recordings. Physical presence at the original event is not a prerequisite for every warranted attribution. A later analyst can compare preserved sequences, inspect alternative transcriptions and identify a distinction missed by an earlier description. The warranted range of such inquiry depends on what the record retains and on the knowledge needed to interpret it. A recording can preserve a difference that a summary erases, while still omitting another difference important to a different question.

The adequacy of a record is consequently relative to a purpose without becoming arbitrary. A final utterance may suffice for a narrow claim about an attested expression. A claim about how participants arrived at that utterance may require the preceding exchange. An attribution of antecedent understanding may require an earlier anchor that neither the final utterance nor the full later exchange provides. These differences concern the evidential demand of the claim. They do not rank records independently of the questions asked of them.

An adequate account must also preserve the possibility of criticizing the investigator's categories. If the retained material repeatedly resists an intended classification, adjusting the material's description solely to restore the classification would insulate the inference. A more informative revision makes the failed fit and the proposed replacement available for comparison. The later sections examine how such revisions can be represented without confusing improved interpretation with recovery of missing historical information.

## 2.4 Collaborative Research

Collaborative fieldwork examines who participates in framing the evidential question. Czaykowska-Higgins distinguishes linguist-focused research from Community-Based Language Research involving community participants in knowledge construction [2]. Leonard and Haynes develop collaborative consultation through Warm Springs and Miami cases, including negotiations over speakerhood. Their account acknowledges that questions shaped replies and that participants changed the questions. The reported views are presented within their particular research relations rather than offered as universal definitions [13, pp. 279–290]. Wertheim's situated fieldwork account further reports effects of researcher positioning on available linguistic styles [17].

A central issue for the present paper is whether a participant challenges an answer or the question that makes the answer intelligible. A request to identify a competent speaker can presuppose a conception of competence that another participant disputes. The dispute may concern practical abilities, social standing, historical continuity or the purposes of the research. An answer can be accurate under one conception while inappropriate to another. An inquiry that records the answer without the contested conception can make its result appear more determinate than the encounter warrants.

The resulting revision can be epistemically productive even when it changes the original research question. A better question can expose a distinction the initial design could not articulate. Its value

should be stated through that achievement. The investigator should also preserve the fact that the target changed, because an answer to the revised question does not automatically settle the earlier question. Where the two questions are connected, the connection needs an argument. A change in vocabulary, respondent selection or criteria may alter the relation between the earlier and later findings.

Participation in framing inquiry also differs from agreement on its findings. Participants may share responsibility for a project while disagreeing about its categories or conclusions. Their differences can concern distinct forms of expertise, different histories or conflicting practical purposes. The analytical task is to identify how each contribution bears on the claim. Treating collaboration as a single community voice would obscure precisely the differences through which a question may become better specified.

The paper therefore treats participant correction as a possible change to the inquiry's inferential structure. A correction can alter the proposed object, the description of a response, the comparison class or the permission to pursue further evidence. These changes have different consequences. Some improve an inference, some narrow its scope, and some establish a boundary on continued inquiry. Their significance cannot be inferred from the label of participation alone.

## **2.5 Enactive Participation**

The enactive account of De Jaegher and Di Paolo gives interaction a role in explaining how sense-making is transformed. Their proposal connects regulated coupling with the continuing autonomy of the interactors and distinguishes degrees of participation extending to joint sense-making. They also recognize that coordination need not indicate positive rapport [3, pp. 492–500]. This provides a developed theoretical interlocutor for a historical account of inquiry, while leaving room to distinguish explanation of a participatory process from assessment of its evidential claims.

The present distinction concerns two kinds of success. An encounter can succeed in generating a shared practical distinction, and its participants can accurately report that new achievement. The same success supplies different support for a claim that the distinction was already shared before the encounter. The latter claim introduces an earlier target whose relation to the achievement needs to be established. Recognizing the generative character of an encounter therefore increases the importance of specifying historical warrant.

Participation can also transform an investigator's capacity to ask a question. This creates a productive dependency: some evidence may become intelligible only after the investigator has acquired an appropriate distinction. The dependency becomes problematic when the investigator treats the acquired distinction as proof that the earlier material must have embodied it in the same way. The inquiry needs a route from acquired access to a supported attribution. Its success is assessable through the distinctions the investigator can now apply and the evidence those applications disclose.

The enactive framework is not assimilated into Generative Relational terminology. Its specific account of autonomy, social interaction and sense-making belongs to its own theoretical commitments. The present models examine selected evidential dependencies and inherit no claim that an algebraic operation or field trajectory exhausts those commitments. Translation is useful where an explicitly specified relation can be preserved; remaining differences supply limits to the translation.

## **2.6 Methodological Interfaces**

The selected traditions make different portions of an inquiry available for assessment. Elicitation organizes responses to supplied contrasts. Interactional analysis examines the sequence and embodied activity that give conduct its local significance. Transcription analysis scrutinizes the record's construction. Collaborative inquiry can reopen the categories and purposes of research. Enactive analysis investigates the dynamics through which participation changes sense-making. Their contributions overlap, while their explanatory objects and warrants remain distinguishable.

The present paper connects these resources through a bounded inquiry history. Its question is whether the relation between an earlier target, an intervention, a retained record and a developing interpretation supports the attribution being made. A history-sensitive representation can expose where that connection

requires an assumption. It cannot establish the assumption merely by representing it. The adequacy of a comparison class, the interpretation of a correction and the relevance of an earlier record remain substantive matters for inquiry.

Methodological pluralism consequently has an operational meaning here. A mathematical non-identification example can show that selected records leave a target unresolved within stated alternatives. A carefully examined episode can show why a proposed alternative is relevant or why an apparent difference was misclassified. A controlled comparison can investigate whether the distinction persists across specified conditions. None of these achievements automatically supplies the others. Their combination is justified by the relation among the questions they address.

The contribution pursued in the following sections is therefore an investigation of evidential continuity during changing participation. It inherits established attention to elicitation, repair, transcription, collaboration and interactional generation. Its additional task is to make the investigator's changing access and classifications visible within the conditions of a particular historical attribution.

### **3 Encounter Warrant**

An inquiry episode supplies evidence through relations that can develop during the inquiry itself. A question may become intelligible only after an explanation; a participant may correct the investigator's description; collaborators may acquire a distinction while producing the response that records it. This section develops the warrant appropriate to such episodes. It first specifies the historical claim, then examines the contributions of coordination, discriminating evidence and mixed formation. The resulting account connects a supported interpretation to its grounds without requiring the encounter to leave every participant unchanged.

#### **3.1 The Historical Claim**

The object of an attribution includes its temporal location. A claim that a participant understood a distinction before an interview differs from a claim that the participant learned it during the interview. A claim that collaborators can presently use a distinction differs from a claim that either could previously use it alone. The later achievement can be equally valuable in each case, while its evidential implications differ. Specifying the claimed time and bearer identifies which of these implications the investigation needs to establish.

The earlier interpretive-uptake inquiry already separates interpretation before clarification, later interpretation and prospective capacity. Its target-preserving evidence extension retains the historical question while representing the effects of subsequent interaction [11, Section 7]. The present investigation inherits that distinction and develops its consequences for an encounter in which the investigator's capacities and categories can also change. The historical claim may concern a participant, a joint practice or the investigator's own understanding. Its bearer follows the particular activity whose organization the claim describes.

Consider a constructed collaboration preparing captions for an oral-history collection. The investigator initially classifies an editor's correction as disagreement about factual content. The editor explains that a sentence can be factually plausible while wrongly presenting an inference as the testimony of a named speaker. Following several examples, the investigator begins to distinguish factual correction from correction of attributed evidential standing. A final acceptable caption records a practical achievement. Several historical claims remain possible: the editor already used the distinction; the investigator acquired it during the encounter; the collaborators developed a new way of marking it; and the underlying practice had previously expressed the distinction less explicitly.

These claims can coexist. Their coexistence does not remove the need for separate grounds. Earlier editorial decisions can support a claim about antecedent practice. The investigator's initial errors and later differentiated responses can support learning. The introduction and later reuse of a new qualifier can support local formation. A single final caption leaves their relations largely unspecified. The complete

episode gains evidential significance when its record distinguishes which contribution was available at which point.

Historical specification also governs the size of the claim. An editor's competence with one documentary contrast does not establish mastery of every distinction in the collection's languages. The relevant accomplishment may concern a limited genre, a pair of interlocutors or a supported editorial operation. Such limits identify a positive finding. They preserve the difference between evidence about the selected practice and a broader attribution that would require further grounds.

### **3.2 Coordinated Achievement**

Coordination supplies a useful starting point because it establishes that participants have produced some organized joint result. In the caption example, collaborators may agree on an acceptable wording, anticipate one another's corrections and apply the wording in another entry. Their interaction has acquired a practical regularity. The epistemic question concerns what explains that regularity and which interpretation it supports.

Several mechanisms can yield an accepted caption. The investigator may understand the editor's distinction. The investigator may memorize the preferred phrase, defer to the editor's position or follow a display convention that happens to select the appropriate answer. The editor may also simplify a more complex practice to make collaboration possible. The shared result therefore gives the inquiry a phenomenon to explain, while the explanation requires evidence about its production.

This distinction preserves the positive importance of coordination. A jointly usable distinction can become an object of knowledge even when its earlier history remains uncertain. Collaborators may know how a newly adopted annotation functions because they have established and tested its use. That claim concerns the present arrangement. A claim that the annotation expresses an unchanged ancestral convention adds a different historical burden.

The distinction also protects disagreement. An investigator can understand why the editor proposes a qualifier while judging that it obscures another relevant source. Their disagreement may exhibit a developed interpretation of the issue. Coding agreement as understanding would discard this possibility. The uptake manuscript's separation of interpretation, correctness, acceptance, action and procedural validity provides the inherited basis for retaining it [11, Sections 3–5].

The relevant bearer can remain distributed. One collaborator may recognize source differences, another may preserve provenance, and a third may formulate an appropriate expression. Their successful operation belongs to the organized relation among those contributions. An inquiry can attribute that joint achievement while investigating each participant's contribution separately. The capacity-attribution study develops the corresponding warning against assigning the whole supported outcome to the person who happens to produce the final response [12, Section 9].

### **3.3 Discriminating Reasons**

A warranted interpretation should explain features of the episode that matter to the selected claim. Its support increases when those features distinguish it from alternatives made plausible by the encounter. This comparative requirement gives the inquiry a positive direction: seek evidence that would differ if the proposed interpretation were mistaken in a relevant way.

In the caption case, transfer to another entry can matter when the new entry separates source standing from factual accuracy. Suppose a statement is accurate according to an independent document but absent from the speaker's testimony. An investigator who preserves the distinction between the two sources has exhibited something that simple repetition of the editor's last wording does not explain. The interpretation remains defeasible, but the observation bears on a specified alternative.

Transfer is useful through this inferential role. A new item that reproduces every cue in the instructional example may add little. A substantially different item may test another operation altogether. The investigator must explain which relevant relation persists across the comparison and which plausible shortcut it disrupts. The description of a task as new or difficult cannot replace that argument.

The same care applies to convergent evidence. An interview, a transcript and a later summary can all derive from the same assertion. Agreement among them may show faithful transmission while providing little additional support for the assertion's truth. Conversely, one episode can supply several differently grounded observations: an unprompted correction, an earlier independently retained example and a subsequent application that separates live alternatives. Evidential diversity concerns the relations among reasons, rather than the number of documents or methods.

Comparative reasoning does not require eliminating every imaginable account. An unrestricted family can always accommodate unobserved differences, as the earlier finite-test argument makes explicit [11, Section 6]. The practical burden is to justify the comparison family, address alternatives warranted by the setting and retain the scope of the resulting inference. A model that excludes an evident instructional effect would fail that burden even if it yielded a unique mathematical answer.

### 3.4 Mixed Evidential Histories

Participation often combines disclosure and formation. An editor can bring an established practical differentiation to an encounter while acquiring a new explicit vocabulary for it. The investigator can learn that differentiation while proposing a more systematic annotation. The joint practice can retain the earlier distinction and change its range of application. Describing this history requires identifying what each process contributes.

A useful account begins with the target's components. The antecedent practice may distinguish testimony from editorial inference without using the proposed label. The encounter may supply the label, connect it with a reporting convention and extend the distinction to digital search. Evidence about the earlier practical contrast need not establish the earlier presence of the later interface or vocabulary. Evidence about the new interface need not erase the inherited contrast that makes it intelligible.

The historical relation is consequently selective. The investigation should state which earlier contribution continues, what the encounter supplies and what changes through their combination. This approach follows the reconstruction manuscript's separation of a present configuration, a source feature and a present learning outcome [10, Sections 9–10]. Their connection is an argument to establish, rather than an identity obtained from a common word such as knowledge.

Mixed histories also permit partial positive conclusions. A participant's correction may establish that the investigator's original account omitted a relevant distinction, while leaving the distinction's earlier distribution uncertain. A surviving record may establish an antecedent contrast without showing that every current collaborator understood it before the inquiry. An informative finding can preserve these differences. Replacing them with an undifferentiated judgment of success would obscure what the evidence has achieved.

### 3.5 Revisable Attribution

The proposed warrant joins the claim's specification, its access conditions, the episode's transformations and the comparison of live alternatives. These components should be connected in the explanation. A list of interventions beside a list of observations would leave the reader to infer how the former affect the latter. The account should explain why the recorded transformations support, qualify or undermine the attribution being made.

Revision then becomes a structured outcome. If an earlier recording reveals that the disputed distinction was already used, the historical claim can strengthen while the account of the investigator's learning remains intact. If the recording shows that the editor introduced the distinction only after the investigator's prompt, a present shared-use claim can survive while the stronger antecedent attribution changes. If participants identify an omitted source difference, the target itself may need refinement.

A changed target should retain its relation to the original question. Narrowing a claim from general understanding to accurate handling of one documentary contrast can constitute epistemic progress. The gain lies in a better supported account of the actual episode. Presenting the revised claim as if it had

always been the question would conceal why the revision was necessary and which original expectation remains unsupported.

The resulting standard is defeasible and comparative. It supports a local attribution when the evidence connects the specified bearer and historical target through a defensible account of access and transformation, while substantive alternatives have been addressed at the claimed resolution. Some inquiries will support only a present achievement or a bounded interpretation. Others can support antecedent understanding as well. The next section examines a central source of that variation: the investigator's acquisition of the capacities through which the evidence becomes readable.

## 4 Interpretive Learning

An investigator's ability to use evidence belongs to the history of an inquiry. A record can remain materially stable while its significance changes through acquired competence, participant correction or a revised comparison. This section examines that development without assigning automatic superiority to participation. The argument distinguishes practical attention, newly readable records, retrospective attribution and shared formation. It then identifies a positive case for inquiry conducted through records. Each case asks which change makes the selected claim better supported.

### 4.1 Practical Attention

Interpretive learning can concern what the investigator notices before it concerns which explicit proposition the investigator accepts. A pause initially treated as an interruption may become relevant to turn allocation. A correction initially treated as disagreement about content may concern the source from which the content is attributed. Acquiring such a distinction changes the questions the investigator can formulate and the observations that can count as answers.

Participation can support this acquisition through consequences that expose an inadequate description. In the caption collaboration, the investigator may produce a factually correct entry that the editor repeatedly rejects. Asking for another factual correction leaves the disagreement unresolved. Following the editor's use across contrasting entries can make the source-standing distinction intelligible. The investigator learns partly through the failure of an earlier way of organizing the activity.

That failure has a specific epistemic role. It supplies a reason to reconsider the initial classification because the classification does not explain the differentiated corrections. The editor's account proposes a better interpretation. Later applications can test whether that account explains the contrast and whether the investigator can use it outside the original example. The sequence can support learning without making every participant correction decisive by definition.

The normative-formation manuscript already treats pre-explicit differentiation and the historical formation of vocabularies that alter subsequent attention [6, Sections 2–3]. The current application concerns the investigator's access to linguistic evidence. A newly acquired vocabulary can articulate an earlier difference, reorganize it or make a new difference practically salient. Which account fits requires the history of the particular inquiry.

The learning claim should also identify an ability more precisely than a sense of familiarity. An investigator may become comfortable in a setting while continuing to misinterpret a consequential distinction. Conversely, a limited but carefully corrected encounter may teach a narrow contrast effectively. Duration, proximity and emotional intensity can form part of the learning conditions, but the proposed epistemic improvement concerns the acquired discrimination and its warranted application.

Goodwin's analysis of a soil-color comparison provides a concrete adjacent case: moving the sample changes the comparison available to participants [4, pp. 1508–1520]. The example supports attention to organized access within a particular activity. Its relevance here is to motivate examination of how an encounter makes a distinction usable, while the warrant of a linguistic attribution requires its own account.

## 4.2 Newly Readable Records

Material preservation and readable evidence have different histories. A recording can retain distinctions that an investigator's initial description fails to register. After learning how a practice organizes correction, the investigator may revisit the recording and identify differences previously grouped together. This rereading can improve knowledge of the recorded encounter without a new measurement of that original event.

The improvement still has evidential inputs. Later training, participant explanations, comparison cases and an examination of earlier coding can supply auxiliary reasons for using the revised interpretation. The claim is therefore more specific than the assertion that interpretation creates information without support. The original record contributes the retained discriminator; the later inquiry contributes an account of how and why it bears on the target.

Suppose two earlier exchanges ended with the same caption. In one, the editor corrected an attribution to a named speaker. In the other, the editor corrected the factual description while accepting the attribution. A summary containing only the final caption merges the difference. A retained interaction recording may preserve the relevant objections and responses. Learning the distinction can make that recording usable for a target that the summary cannot settle.

The difference between these records identifies a limit on retrospective improvement. An investigator who retains only the common summary cannot infer the missing correction history merely by learning a more refined vocabulary. Another record, testimony or defensible auxiliary inference is needed. The reconstruction manuscript's target-relative trace criterion already states the formal basis for this limit [10, Section 10]. The present application adds the practical question of which retained record the developing investigator can actually read.

Bucholtz's treatment of transcription gives this distinction a methodological setting. Her account separates selection from representation and recommends reconsidering recordings through alternative hearings [1, pp. 1439–1443, 1461–1463]. The present inference is that a revised transcript can improve evidential access while the earlier event remains fixed. The improvement requires reasons for the revision; reflexive acknowledgment alone does not establish it.

Even a sufficiently informative record does not automatically supply a usable method. A mathematical decoder may exist while an investigator lacks the competence, tools or contextual knowledge required to implement the relevant interpretation. Conversely, an investigator may read a contrast competently before possessing a complete explicit procedure for describing that ability. Formal sufficiency and practical interpretive access should therefore remain connected through an account of the activity, rather than treated as interchangeable descriptions.

This distinction matters to later algebraic representation. An algebra of functions determined by a record can characterize mathematical information while including functions that no participant currently knows how to interpret or execute. Its elements are not thereby an inventory of achieved understanding. The application should identify the relevant query repertoire and explain how the inquiry makes selected queries usable.

## 4.3 Retrospective Attribution

A successful rereading can support different claims about the past. An old exchange may exemplify a difference that an analyst now describes. Earlier participants may have practically oriented to that difference. They may also have explicitly used the analyst's present vocabulary. These are distinguishable attributions, and the evidence needed for one need not establish the others.

In the caption example, a present distinction between source attribution and factual accuracy can organize the analyst's comparison of earlier revisions. The analyst can make that descriptive comparison even if the earlier participants used different terms. A claim that the participants themselves tracked the distinction needs evidence about their corrections, expectations or consequential choices. A claim that they possessed the current annotation scheme needs further evidence about that scheme.

The separation permits historical understanding without demanding terminological identity. Earlier participants can demonstrate a practical differentiation through situated correction even where a later analyst gives it a new name. It also prevents anachronistic projection. The analytical usefulness of today's scheme cannot establish that every element of it governed yesterday's practice.

Retrospective judgment consequently requires a bridge between the evidence and the historical target. The bridge may concern a stable referent, a recurring inferential role, a pattern of correction or an institutional procedure. Its adequacy depends on what the claim attributes. The uptake inquiry's semantic-bridge account already makes these interpretive commitments explicit [11, Section 5]; its relevance here is that the bridge itself can develop through the investigator's learning.

A revised bridge should preserve an intelligible comparison with its predecessor. If a transcript's old label meant factual error and its new label means disputed source standing, an unchanged label cannot stand for an unchanged category. The revision record should explain the altered meaning and the evidence supporting the recoding. Otherwise the apparent persistence of a code can conceal a substantive shift in the inquiry.

Some historical questions will remain unresolved after a successful rereading. The record may show that two kinds of correction occurred while leaving their distribution among earlier participants unclear. The new interpretation can still constitute a bounded epistemic gain. It makes a distinction available and locates the remaining uncertainty, rather than converting every interpretive improvement into a complete account of antecedent understanding.

#### **4.4 Shared Conceptual Formation**

An inquiry can also help form the distinction it subsequently studies. Collaborators might discover that their existing vocabulary handles direct testimony and editorial inference poorly when several sources jointly support an entry. They may introduce a new qualifier, explain its purpose and test it on additional cases. The resulting practice becomes a present object of investigation.

Its formation does not deprive it of epistemic value. Participants can learn the commitments attached to the new qualifier, understand its limits and discover whether it resolves the difficulty that motivated its introduction. The appropriate claim concerns the developing local practice and its consequences. A further claim that the qualifier expresses a previously unarticulated shared convention requires evidence of that earlier organization.

Several historical contributions can meet in the new practice. The editor may supply a prior distinction, the investigator a comparison with another documentation task, and a participant an objection exposing a previously neglected case. Their contributions need not be independent. An objection can change the problem to which the proposed terminology responds; the terminology can then make a different objection intelligible. The inquiry develops through these relations, rather than simply adding already complete individual insights.

Formation should therefore be described at the resolution needed by the claim. The new label may be jointly produced while the underlying contrast has a longer history. The contrast itself may acquire a new range or consequence. A general assertion that the whole meaning was created during participation would be as coarse as an assertion that the encounter merely revealed an entirely fixed object.

The relational account also leaves disagreement available as a result. Collaborators can establish that a proposed qualifier works for one documentary purpose while remaining divided about its appropriateness for another. Their inquiry has clarified a boundary. Complete consensus is unnecessary for that finding, and subsequent use should preserve the purpose relative to which the qualifier was assessed.

#### **4.5 Investigator Position**

An investigator acquires access from a position within the encounter. A role can make some explanations available while discouraging others. A collaborator treated as a learner may receive unusually explicit correction; a collaborator treated as an evaluator may receive rehearsed answers. These are analytical

possibilities to examine in a particular inquiry, rather than universal predictions about the effects of research participation.

The relevant position includes more than a declared social identity. It can involve who selects the task, which language is used for disagreement, who controls the recording, what consequences an answer may have and which participant can end the activity. Such relations matter when they alter the interpretation of the observed contribution. Their inclusion should follow that evidential relevance.

Learning can change the position itself. A participant may entrust a more complicated explanation to an investigator who has demonstrated careful use of an earlier distinction. The explanation then supplies new evidence while the relation of access has also changed. A later statement should not be treated as an independent replication of an earlier interview if its production depends on the intervening learning and trust.

This dependence need not weaken the evidence. A history that makes careful explanation possible can strengthen a claim by supplying access that an earlier encounter lacked. The account should identify the dependence so the reader can assess its significance. Confidence may become better grounded through the relationship, or the relationship may encourage agreement that leaves alternatives unexamined. The local history decides which interpretation deserves support.

#### **4.6 Recorded Evidence**

The positive account of participatory learning permits substantial inquiry conducted through records. Consider the limited question of whether a specified annotation occurred in a dated collection, with the collection's identity, transcription and dating independently supported. An investigator can establish that occurrence from the relevant record. Reproducing the original social relation is unnecessary for the claim as specified.

A more demanding record-based inquiry can compare recorded corrections across several entries. If the records retain the relevant sequence, source information and distinctions, they may support a bounded interpretation of how the editorial practice operated. Later participant engagement can add useful evidence, yet the availability of that further method does not automatically invalidate an already warranted record-based finding.

The same records may be inadequate for a claim about present competence, an unrecorded motive or a capacity to sustain the practice after disruption. Their adequacy varies with the target. The cultural-reconstruction account already distinguishes the persistence and epistemic uses of traces from practical transmission and living succession [10, Sections 2,7,9–10]. Those distinctions make methodological pluralism specific: select the access appropriate to the claim and state what remains outside it.

Participation and records can consequently support one another across an inquiry's history. Participation can improve a record's interpretation; records can correct memories, preserve disagreement and support learning beyond the originating encounter. Their connection creates additional questions about provenance and access, but it also creates positive possibilities for knowledge. The historical-carrier construction that follows represents selected parts of this connection while retaining the distinction between an inquiry's evolving organization and the evidence through which its claims are assessed.

### **5 Historical Inquiry Carriers**

The historical object of an inquiry must retain more than its final answer. An investigator can arrive at the same answer through accurate disclosure, instruction, a revised criterion or shared invention. This section specifies a representational carrier that preserves those differences before examining what an available record discloses. It first locates the inquiry within a history-bearing formation, then distinguishes a complex, an executed history, an interpretation and a record. The construction applies the taxonomy's historical and retained-content architecture [8, Section 3]; it supplies a bounded carrier for the following models rather than a new general ontology.

## 5.1 The Represented Encounter

Let  $X_h$  denote a relational formation as retained through a selected history  $h$ . Its selected contents can include participants, documents, bodily actions, instruments, expectations, role relations and recognized alternatives. The investigator belongs within that formation when the investigator's actions affect its subsequent course. A representation that treats every researcher contribution as external noise can then omit part of the phenomenon it seeks to explain. Including the contribution in the represented history makes its causal and interpretive role assessable.

Historical inclusion does not make every component equally relevant to the claim. An inquiry about a particular correction may retain the preceding question, the available alternatives, the correction and its uptake. It may leave the participants' unrelated earlier lives unspecified. The selection requires an argument about dependence: the retained history should represent the differences on which the proposed attribution and its live alternatives turn. This provides a finite research task while keeping its omissions visible.

A labelled two-complex is one possible representation of the selected spacetime. Its ingredients are stated in Equation 1.

$$K_h = (V_h, E_h, F_h, \partial_1, \partial_2, \ell_h, \prec_h), \quad \partial_1 \partial_2 = 0. \quad (1)$$

In Equation 1,  $V_h$  contains represented events or articulated boundary positions;  $E_h$  contains selected continuations and interfaces;  $F_h$  contains attached comparison or encounter surfaces. After orientations and a coefficient field have been chosen, let  $C_q(K_h)$  be the vector space freely generated by the  $q$ -cells. The cellular maps have types  $\partial_2 : C_2(K_h) \rightarrow C_1(K_h)$  and  $\partial_1 : C_1(K_h) \rightarrow C_0(K_h)$ . A label map  $\ell_h : V_h \sqcup E_h \sqcup F_h \rightarrow \Lambda_h$  takes cells to a declared interpretive label set  $\Lambda_h$ . A partial precedence relation  $\prec_h$  applies to the events for which temporal order is supplied. An interface edge need not itself express temporal precedence. Thus an incidence cycle need not describe travel backward in time.

The complex represents selected organization. Its topological validity does not prove the validity of its linguistic labels. A face can register that two routes are being compared; it does not assert that they have the same social effect. A spin-foam construction would additionally require appropriate representation labels, compatibility data and amplitudes or weights. None follows from Equation 1, and the present investigation does not need to add them.

## 5.2 A Concrete Attachment

A small comparison clarifies the information carried by a face. Choose vertices  $v_0, v_1, v_2, v_3$  and oriented edges  $e_{01}, e_{13}, e_{02}, e_{23}$ , with  $\partial_1 e_{ij} = v_j - v_i$ . Let  $f$  be attached around the two routes from the initial to the final comparison boundary. Its boundary and the resulting chain identity are given in Equation 2.

$$\begin{aligned} \partial_2 f &= e_{01} + e_{13} - e_{02} - e_{23}, \\ \partial_1 \partial_2 f &= (v_1 - v_0) + (v_3 - v_1) - (v_2 - v_0) - (v_3 - v_2) = 0. \end{aligned} \quad (2)$$

Equation 2 verifies the attachment. It proves no equality of the transformations assigned to the two edge words. One route may record an initial answer followed by clarification; the other may record instruction followed by an answer. The final vertex can stand for a common coarse comparison boundary, such as the same caption or response. The two complete histories still retain different intermediate events.

Figure 1 depicts this restricted comparison. The shared endpoint is deliberately a selected record boundary. Identifying that point with an identical complete history would erase the distinction the figure is intended to retain.

The example also locates the role of an auxiliary record. Retaining the route label can distinguish the two modeled histories even when the final response does not. Whether it establishes the desired historical attribution depends on what happened along the route. A label saying that clarification occurred does not determine what was supplied or learned. The representation can therefore require a richer edge label or a refined sequence of cells. That refinement is justified by a question about the encounter, rather than by a general preference for more complicated topology.

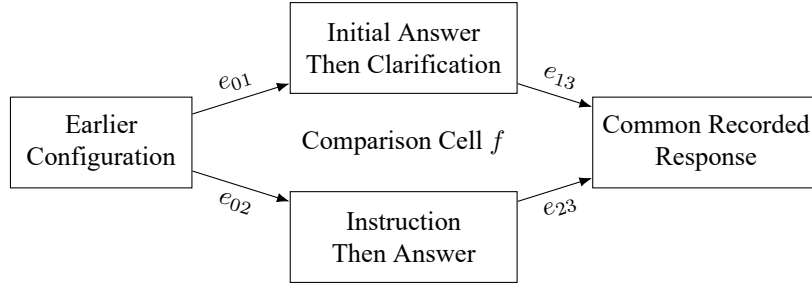


Figure 1: Inquiry Route Comparison. The attached cell records a comparison between routes whose selected endpoint records agree. It asserts neither equal full histories nor commuting inquiry operations. The route descriptions are schematic and stipulated.

### 5.3 Anchored Extension

Fix a represented earlier region  $K_-$  relevant to the inquiry. An embedding  $\iota_h : K_- \hookrightarrow K_h$  identifies its retained historical structure. An inquiry operation can extend the represented history while preserving this anchor. Let  $j_a : K_h \hookrightarrow K_{T_a h}$  be the declared extension embedding. The compatibility condition is Equation 3.

$$j_a \circ \iota_h = \iota_{T_a h}. \quad (3)$$

Equation 3 says that the earlier represented cells remain identifiable after the operation. It does not say that every current capacity, relation or interpretation remains equal. Instruction can preserve a record of the pre-instruction episode while changing the learner. A new analysis can preserve the recorded event while revising its interpretation. The field-power manuscript already distinguishes historical anchoring, current evaluation and transformation of future operation families [7, Sections 8–9].

The model also permits a newly generated encounter to introduce a fresh participant role or a new kind of question. Such change needs a target complex and typed correspondences for retained structures. Reweighting an unchanged list of questions would represent a different process. An old operation can acquire several descendants, become unavailable, or lack a justified correspondence. The inquiry should report that status rather than silently applying an old code to a newly articulated practice.

Anchoring must be kept distinct from historical certainty. An investigator may possess only a partial record of  $K_-$ . A mathematical model can retain a detailed candidate anchor for each possible history even when the investigator cannot decide which candidate occurred. The inclusion of the past in the modeled object therefore creates no automatic epistemic access to it. This distinction is central to the observable algebras introduced in Section 6.

### 5.4 Partial Inquiry Operations

For the operator construction, choose countable families  $H_0$  and  $H_1$  of symbolic histories before and after a specified inquiry step. Countability is a representational restriction, not a claim that all possible social or continuous field histories are countable. An operation has the type given in Equation 4.

$$U : D \subseteq H_0 \longrightarrow H_1, \quad U(h) = h \cdot a(h). \quad (4)$$

The appended event  $a(h)$  in Equation 4 includes the selected contribution and its relevant configuration update. Retaining the full source prefix makes  $U$  injective on  $D$ , even if its endpoint projection is many-to-one. The domain  $D$  records the assumptions under which that operation is actually represented: available interlocutors, materials, permissions or an applicable task can matter to its interpretation.

An operation schema can admit several outcomes. A selected realized branch can be modeled by one partial map of the stated type, with its branch information retained. Treating an unresolved branching schema as a deterministic map would add an unsupported assumption. Similarly, an intended interview, a declined interview and an executed interview are different histories. When refusal is recorded as an

event it should have its own interpretation. When no observation is available, the model should preserve that absence rather than invent a response value.

An executable word retains each intermediate domain condition. If  $U_1 : D_1 \rightarrow H_1$  and  $U_2 : D_2 \rightarrow H_2$ , the composite is defined on the set in Equation 5.

$$\text{Dom}(U_2 U_1) = \{h \in D_1 : U_1 h \in D_2\}. \quad (5)$$

Equation 5 makes the order consequential before any numerical effect has been assigned. An earlier clarification can enable a question, invalidate its original interpretation, or lead a participant to withdraw. The associativity of well-typed composition does not make those orders interchangeable. These typing and historical distinctions are inherited features of the prior formalism [7, pp. 33–35].

## 5.5 Interpretive Access

Let  $o_i : H_i \rightarrow Y_i$  be a declared retained-record map, with  $Y_i = o_i(H_i)$  its realized range. A record can include utterances, timing, gestures, supplied examples, correction sequences and declared non-observation. Its actual contents depend on the chosen inquiry and permissible access. Equality of records can leave different represented histories compatible.

An investigator's interpretive resource is not exhausted by the stored record. For an investigator state  $k$ , let  $\Gamma_k$  be a declared family of interpreted readouts on that record space. The family lists operations of reading for which the investigation claims an available competence and justification. The information mathematically determined by the record can be richer than  $\Gamma_k$ . A stored contrast can exist before the investigator knows how to use it, while an imagined decoder can exist mathematically without being practically available.

The full readable diagonal algebra below represents the former information question. An algebra generated by selected readouts can clarify their combinations, but its norm closure should not be identified with an inventory of skills. A limit of mathematical functions need not correspond to an executable procedure, a permitted disclosure, or an intelligible linguistic comparison. The gap between a retained distinction and usable interpretive access therefore remains represented rather than defined away.

Finally, fix an earlier query  $\theta_0 : H_0 \rightarrow Q$  where the application supplies its interpretation. On  $U(D)$  the anchored query has value  $\theta_0(h)$  at  $Uh$ . The current endpoint query can have a different value because it asks about a later configuration. The anchored query is invariant along its represented continuation by construction. That bookkeeping fact establishes neither that inquiry preserved the current target nor that its value can be read from  $o_1(Uh)$ . The next two sections develop precisely these access and comparison obligations.

## 6 Inquiry Evidence Algebras

An inquiry record can determine some distinctions while leaving others unresolved. This section gives that dependence an operator representation and examines its behavior during a partial inquiry operation. The construction separates information determined by a record, an investigator's practical access, and preservation of a historical target. Its main conditional result identifies the requirements for translating a later readout through an earlier record. The result applies the inherited quotient-consistency argument to changing inquiry records; its general mathematical principle is already present in the metamodel and criterion-comparison manuscripts [5, pp. 22–25, 79][9, pp. 5–7].

### 6.1 Interpreted Record Carriers

Retain the countable history carriers  $H_0, H_1$  and the injective partial inquiry extension  $U : D \rightarrow H_1$ , with  $D \subseteq H_0$ . A history retains the source participants, investigator, interventions, and records selected by the model. The extension appends its source history, even when its endpoint effect changes a participant's

organization. The full modeled history therefore supplies a richer object than the transcript actually accessible to the investigator. Countability is a restriction of the present representation.

Let  $o_i : H_i \rightarrow Y_i$  be the interpreted record at stage  $i \in \{0, 1\}$ , and take  $Y_i = o_i(H_i)$  so that only attained records belong to its range. The term *interpreted* matters. An acoustic trace, a transcription, and a classification of the transcription can retain different distinctions. An investigator who learns to hear a contrast may obtain a different interpreted record from the same retained recording. The model must declare which of these objects  $o_i$  reports.

The totality of  $o_i$  is also a modeling choice. The carrier can contain only histories for which the selected readout is defined, provided the operation's source and target remain well typed on that restriction. Alternatively, a record can explicitly distinguish an unresolved interpretation, unavailable access, and a completed reading. An unresolved value then describes the state of the inquiry; it supplies no negative finding about the participant's competence. Silently assigning the same empty record to these different conditions would change the questions the model can answer.

These readout maps do not validate their classifications. The semantic-bridge analysis already requires an argument connecting a target, contrast tests, candidate histories, and interpretive criteria [11, pp. 6–10]. The algebra below makes the consequences of a supplied readout inspectable. Its construction leaves those substantive premises available for criticism.

## 6.2 History-Appending Representation

For each stage, let  $\mathcal{H}_i = \ell^2(H_i; \mathbb{C})$ , with canonical vector  $\delta_h$  for  $h \in H_i$ . Complex coefficients provide a linear representation of history records. They are not empirical probabilities or amplitudes of linguistic understanding. Define the operator  $L : \mathcal{H}_0 \rightarrow \mathcal{H}_1$  on canonical vectors by Equation 6.

$$L\delta_h = \begin{cases} \delta_{Uh}, & h \in D, \\ 0, & h \notin D. \end{cases} \quad (6)$$

Injectivity of  $U$  gives orthogonal images to distinct admitted source histories. For every finite linear combination  $\xi$ , Equation 6 therefore gives  $\|L\xi\|^2 = \sum_{h \in D} |\xi_h|^2 \leq \|\xi\|^2$ . Density supplies the unique bounded extension. This is the history-appending construction used in the dormant-capacity investigation [12, Section 7].

For a subset  $B$  of either history carrier, let  $P_B$  be the projection onto the closed span of its canonical vectors. The adjoint  $L^*$  returns the unique predecessor of an image history and annihilates vectors outside that image. Consequently Equation 7 holds.

$$L^*L = P_D, \quad LL^* = P_{U(D)}. \quad (7)$$

Equation 7 identifies  $L$  as a partial isometry. The proof depends on retention of the source history. A many-to-one endpoint update would not generally yield the same calculation. The adjoint removes a specified appended record within the representation; its existence supplies no intervention that reverses teaching or restores a prior relationship. Likewise, zero in Equation 6 denotes inapplicability of the represented operation, not a participant's zero-valued answer.

## 6.3 Record-Determined Observables

For a bounded function  $a : H_i \rightarrow \mathbb{C}$ , define the diagonal multiplication operator  $M_a\delta_h = a(h)\delta_h$ . Its norm is the supremum of  $|a|$  on  $H_i$ . The algebra determined by the stage- $i$  record is stated in Equation 8.

$$\mathcal{A}_i = \{M_{f \circ o_i} : f \in \ell^\infty(Y_i; \mathbb{C})\} \subseteq \mathcal{B}(\mathcal{H}_i). \quad (8)$$

Here  $\ell^\infty(Y_i; \mathbb{C})$  is the space of bounded complex-valued functions on the attained records, and  $\mathcal{B}(\mathcal{H}_i)$  is the bounded-operator algebra. Addition, multiplication, conjugation, and uniform limits act pointwise. Thus Equation 8 defines a unital, norm-closed, commutative operator algebra. A bounded diagonal

operator belongs to it exactly when its diagonal function is constant on each fibre of  $o_i$ . Indeed, such constancy defines one value for every attained record; conversely, a function of the record assigns equal values to histories sharing that record.

The construction distinguishes mathematical determination from practical possession of a skill. A function can be determined by the declared record while the investigator lacks the competence, resources, or permission to compute it. For the investigator at stage  $i$ , write  $\Gamma_i \subseteq \ell^\infty(Y_i; \mathbb{C})$  for the selected bounded scalar queries included in the practical repertoire of Section 5. Their realization, interpretation, and permission conditions remain additional data. Membership in the algebra is an informational property; membership in  $\Gamma_i$  is an additional claim about the inquiry. This separation follows the earlier distinction among operation types, executable transformations, and an algebraic carrier [7, pp. 21, 33][8, Sections 7–8].

In particular, choosing  $o_i$  to be a complete raw waveform and then admitting every bounded function of it would already place every mathematically encoded distinction in  $\mathcal{A}_i$ . An account of investigator learning must then concern changed practical access or changed criteria. If it concerns a change in the algebra of interpreted readouts, the readout map itself must change. Neither description automatically grants the investigator the full informational closure of a stored trace.

## 6.4 Partial Readout Transport

The inquiry extension pulls endpoint observables back to source histories. Direct evaluation on canonical vectors gives Equation 9.

$$L^* M_{f \circ o_1} L = M_{\mathbf{1}_D (f \circ o_1 \circ U)}. \quad (9)$$

The right side is extended by zero outside  $D$ , where  $U$  is undefined. Equation 9 asks whether the old record determines a specified later readout, including the operation's applicability. On diagonal observables this pullback preserves products and adjoints: pointwise multiplication uses  $\mathbf{1}_D^2 = \mathbf{1}_D$ . Its identity image is  $P_D$ , so it is generally nonunital. These properties concern the diagonal algebra; arbitrary operator compression need not preserve multiplication.

**Proposition 6.1** (Partial Readout Transport). *The inclusion  $L^* \mathcal{A}_1 L \subseteq \mathcal{A}_0$  holds exactly when  $D$  is a union of complete  $o_0$  fibres and  $o_1 \circ U$  is constant on each such fibre contained in  $D$ .*

*Proof.* Suppose the inclusion holds. Pulling back the identity in  $\mathcal{A}_1$  gives  $P_D \in \mathcal{A}_0$ . Its diagonal must be constant on each old record fibre. Therefore two histories with the same old record are either both admitted or both excluded, proving the domain condition.

Next take  $h, k \in D$  with  $o_0(h) = o_0(k)$ . If  $o_1(Uh) \neq o_1(Uk)$ , choose the bounded indicator function of the single record  $o_1(Uh)$ . Equation 9 gives different diagonal values at  $h$  and  $k$ . That operator cannot belong to  $\mathcal{A}_0$ , contradicting the assumed inclusion. The endpoint records must therefore agree.

Conversely, suppose both conditions hold. On an excluded old fibre, the pulled-back diagonal is identically zero. On an admitted fibre, equality of the endpoint records makes  $f \circ o_1 \circ U$  constant for every bounded  $f$ . The fibre characterization of Equation 8 places each pullback in  $\mathcal{A}_0$ .  $\square$

Proposition 6.1 separates applicability from output consistency. When both hold, define a map  $v$  on the admitted record set  $o_0(D)$ . Choose an admitted history producing the old record and assign its later readout as the value of  $v$ . Fibre consistency makes that value independent of the representative. Domain saturation means that the old record also determines whether the map applies. This is the partial-descent condition already proved in the metamodel [5, p. 79]. The present representation exposes its two requirements through the identity observable and the record indicators. Its value is diagnostic: a failure locates information missing from the earlier record.

## 6.5 Selective Inquiry Domains

Domain saturation is substantive when the inquiry is selectively available. Let  $H_0 = \{h_a, h_b\}$ , let  $o_0$  assign both histories the same record, and admit only  $h_a$ . Suppose  $U$  simply appends a completed

encounter. Then  $P_D$  has values one and zero on the same old fibre, so Proposition 6.1 fails even if every admitted endpoint has the same new record. The old record cannot determine which history permits the encounter.

Conditional analysis of already-admitted histories remains possible. On  $D$ , a constant later record descends through the restricted old observation. That weaker result omits the comparison with excluded histories. It cannot justify treating the admitted cases as representative of all cases sharing their initial recorded features. A refusal, inaccessible interface, or missing authorization can carry different selection mechanisms, and the record must distinguish them when the target requires that distinction.

The example makes a further point about evidence. If a target has value one exactly on  $D$ , observing the operation's applicability identifies that target in the stipulated model. The operation can leave the target unchanged while its selective availability supplies evidence. Preservation and evidential neutrality are different properties. Whether an actual failed attempt is observed, silently omitted, or never made determines which of these records the inquiry possesses.

## 6.6 Historical Target Preservation

Let  $\theta_0 : H_0 \rightarrow \mathbb{C}$  be a bounded historical target and let  $\theta_1^- : H_1 \rightarrow \mathbb{C}$  represent the same earlier target in the extended history. The superscript distinguishes this historical query from a present-state query. Basis evaluation gives the typed intertwining relation in Equation 10.

$$M_{\theta_1^-} L = L M_{\theta_0} \iff \theta_1^-(Uh) = \theta_0(h) \quad (h \in D). \quad (10)$$

Equation 10 is equivalent to the compressed relation in Equation 11.

$$L^* M_{\theta_1^-} L = P_D M_{\theta_0}. \quad (11)$$

For an admitted basis history, both equations require equality of the two target values. For an excluded history, both sides vanish. This proves their equivalence and explains the domain projection in Equation 11. Removing that projection would impose an additional requirement on excluded histories.

These relations express preservation relative to declared targets. They do not establish that the target is readable from either  $o_i$ , nor that the historical comparison is substantively warranted. On a common carrier, a suitable single target multiplier can commute with an inquiry shift, as in the prior capacity diagnostics [12, Section 7]. Commutation with the domain projection alone supplies no such result: diagonal target multipliers and diagonal domain projections already commute regardless of the inquiry's effects.

The positive use of the representation is therefore precise. It separates an operation that changes the target, an operation whose applicability is informative, and an operation whose later evidence requires a richer earlier record. Those distinctions prepare a more selective question: even when the entire revised record cannot be transported, which historical queries remain supported?

## 7 Interpretive Revision Diagnostics

A developing investigator can gain access to distinctions that an earlier record summary did not express. This section identifies which revised queries can still be supported through that summary and which require another retained discriminator. It first derives a query-specific transport criterion, then examines a finite record example and sufficient conditions for a historical decoder. The construction applies inherited observation-fibre and criterion-transport results to the practical problem of changing interpretive access [11, pp. 8–10][9, pp. 6–9]. Its positive purpose is to preserve warranted historical claims even when translation of the entire revised readout fails.

## 7.1 Changed Investigator Access

Three changes can produce a different report from an old recording. The investigator may acquire the competence to detect a retained distinction. A new record or auxiliary source may supply information absent from the original recording. The inquiry may also adopt a new criterion that classifies an unchanged event differently. These changes can interact, but their explanatory roles differ. A claim about improved access should identify which of them supplies the newly discriminating information or the reason for using it.

For a separate illustrative task, a recording may preserve both a statement of completion and a later objection concerning release from an obligation. An investigator who initially hears only a general disagreement may later learn to distinguish those contributions. The original event has not been measured again. Nevertheless, the investigator's later comparative experience and the participants' explanations provide new grounds for the reading. Describing this as reinterpretation need not mean that the old record alone, with no new auxiliary warrant, has generated knowledge automatically.

The mathematical representation separates the retained source from the earlier summary. The new readout  $o_1 \circ U$  can discriminate two source histories that  $o_0$  merged. Proposition 6.1 then rules out complete deterministic reconstruction of the new readout from the old summary. That conclusion is compatible with successful rereading of a richer retained trace. It is also compatible with continued access to a narrower question that the old summary did preserve. Distinguishing these possibilities prevents a failure of full transport from becoming a verdict of general evidential failure.

## 7.2 Transportable Query Classes

Retain the objects of Section 6. For the present result, assume that  $D$  is nonempty and saturated by  $o_0$  fibres. Define the reachable new-record carrier by  $Y_1^U = o_1(U(D))$ . On this carrier, join two records when they arise from admitted histories with the same old readout. The generating relation is stated in Equation 12.

$$r J_U s \iff \begin{array}{l} \text{there exist } h, k \in D \text{ with } o_0(h) = o_0(k), \\ r = o_1(Uh), \quad s = o_1(Uk). \end{array} \quad (12)$$

Let  $\approx_U$  be the smallest equivalence relation containing  $J_U$ . Equivalently, two records are related when they can be joined by a finite chain of generating pairs, with equality allowed. Equation 12 compares records that the earlier summary cannot distinguish. The chain closure matters because one new record can arise from histories belonging to several old fibres, linking their constraints.

For  $f \in \ell^\infty(Y_1^U; \mathbb{C})$ , extend  $f$  by zero to the rest of  $Y_1$ . Its pullback through  $U$  is independent of that extension, because an admitted history always reaches  $Y_1^U$ . The algebra of transportable query functions is stated in Equation 13.

$$\mathcal{T}_U = \{f \in \ell^\infty(Y_1^U; \mathbb{C}) : r \approx_U s \implies f(r) = f(s)\}. \quad (13)$$

Equation 13 specifies the endpoint questions that remain indifferent to every ambiguity imposed by the old summary.

**Proposition 7.1** (Selected Query Transport). *A bounded query  $f$  on  $Y_1^U$  has  $L^* M_{f \circ o_1} L \in \mathcal{A}_0$  exactly when  $f \in \mathcal{T}_U$ . Consequently  $\mathcal{T}_U$  is the largest algebra of bounded reachable-record functions whose individual pullbacks are determined by the old readout.*

*Proof.* Suppose the pullback belongs to  $\mathcal{A}_0$ . For every generating pair in Equation 12, old-readout equality gives equality of its pulled-back values. Since both histories are admitted, these values are  $f(r)$  and  $f(s)$ . Thus  $f$  is constant on every generating pair. Repeated equality along a finite chain makes it constant on each  $\approx_U$  class.

Conversely, suppose  $f \in \mathcal{T}_U$ . Two admitted histories with the same old readout generate a pair of new records, so their  $f$  values agree. Saturation of  $D$  ensures that excluded old fibres receive the

Table 1: Constructed Record Refinement. The revised readout retains a second event distinction. The old summary continues to support the completion query while leaving the release query unresolved.

| Source History | Old Summary | Revised Readout | Completion Query |
|----------------|-------------|-----------------|------------------|
| (0, 0)         | 0           | (0, 0)          | 0                |
| (0, 1)         | 0           | (0, 1)          | 0                |
| (1, 0)         | 1           | (1, 0)          | 1                |
| (1, 1)         | 1           | (1, 1)          | 1                |

common zero value in Equation 9. The resulting diagonal is constant on every old fibre and therefore belongs to  $\mathcal{A}_0$ .

Class-constant bounded functions contain the constant function and are closed under addition, multiplication, conjugation, and uniform limits. They form an algebra. The equivalence just proved includes every function with the required pullback property, so any algebra composed of such functions is contained in  $\mathcal{T}_U$ .  $\square$

Proposition 7.1 permits a more discriminating conclusion than full readout transport. The complete later record may be unavailable from the earlier summary while a selected later question remains answerable. The generated-equivalence construction is an elementary application of the prior quotient machinery. Its substantive interpretation depends on the chosen record, inquiry operation, and question. In particular, the largest mathematical algebra need not coincide with the actual queries in  $\Gamma_1$ .

The domain assumption also deserves retention. If one old fibre contains both admitted and excluded histories, the pullback of a nonzero query can disagree with its zero extension inside that fibre. A question considered only within the admitted cohort can still be transported, but the result then concerns the restricted observation system. That change does not recover the omitted selection information.

### 7.3 Retained Trace Refinement

Consider a constructed four-history model. Let  $H_0 = \{0, 1\}^2$  and write a history as  $h = (x, y)$ . The first bit records whether a selected task was physically completed. The second records whether a separately specified release procedure occurred. These are stipulated event features, not measurements of understanding. Allow all four combinations: for example, a release can be granted even when completion is outstanding. Let  $D = H_0$ , and let  $U$  append an investigator-learning event while retaining the earlier trace.

The old summary reports  $o_0(x, y) = x$ . A richer retained record and the newly acquired reading competence support  $o_1(U(x, y)) = (x, y)$ . Table 1 shows the resulting comparison.

The relation  $\approx_U$  has the two classes  $\{(0, 0), (0, 1)\}$  and  $\{(1, 0), (1, 1)\}$ . A bounded function belongs to  $\mathcal{T}_U$  exactly when it depends only on  $x$ . The completion question remains transportable. The release question  $f(x, y) = y$  fails the criterion because it assigns different values inside each class. This failure precisely identifies what the earlier summary omitted.

The new investigator may still answer the release question from the richer trace if that trace retains the relevant procedure and its identity is warranted. The positive inference has two distinct grounds: the trace supplies the discriminator, and acquired competence supports its interpretation. If only the old summary survives, improved terminology supplies neither missing event bit. Auxiliary evidence would be required. This is the concrete informational limit already illustrated by the metamodel’s coarse-to-fine example [5, p. 79].

A further attribution remains separate. Establishing that a release procedure occurred does not establish that the earlier speaker used the disputed expression to mean release, or that every participant understood that use. Those are semantic and participant-indexed targets. A model equating them with  $y$  would need a defensible bridge. The example therefore gives a positive historical event inference without silently promoting it into a complete account of antecedent linguistic understanding.

## 7.4 Historical Decoder Conditions

A historical claim can use the revised record even when the old summary was insufficient. To state its requirements, let  $Z_0$  be a historical target space and  $\theta_0 : H_0 \rightarrow Z_0$  the query. Let  $Z_1$  contain the values of a revised classification, and let  $d_1 : Y_1^U \rightarrow Z_1$  be its decoder. A proposed comparison  $b : Z_1 \rightarrow Z_0$  relates those revised values to the earlier target. Neither target space requires numerical values.

Introduce  $\theta_1^- : U(D) \rightarrow Z_0$  for the same earlier target on the appended histories. The two required bridges are expressed in Equation 14.

$$\begin{aligned}\theta_1^-(Uh) &= \theta_0(h), & h \in D, \\ b(d_1(o_1(h'))) &= \theta_1^-(h'), & h' \in U(D).\end{aligned}\tag{14}$$

The first line of Equation 14 states historical target correspondence. The second states that the revised decoding, followed by the declared criterion comparison, is faithful to that historical query on the candidate family.

**Proposition 7.2** (Conditional Historical Decoding). *Under Equation 14, the composed decoder  $b \circ d_1$  applied to the revised record returns  $\theta_0(h)$  for every admitted source history. This historical query can also be decoded from the old readout on  $D$  exactly when  $b \circ d_1$  is constant on  $\approx_U$  classes.*

*Proof.* For  $h \in D$ , substitute  $h' = Uh$  into the second bridge and then use the first. The resulting value is  $b(d_1(o_1(Uh))) = \theta_0(h)$ .

For the second statement, if  $b \circ d_1$  is class-constant, equal old records produce equal decoded values. Define the old decoder on  $o_0(D)$  using any admitted representative. That equality makes the value independent of the representative. Conversely, an old decoder makes the composite values equal on every pair generated by equal old records. Equality propagates along the chains defining  $\approx_U$ . Thus the composite is class-constant.  $\square$

Proposition 7.2 applies the inherited factorization criterion to an explicitly transported historical query [11, pp. 8–10][10, Section 10]. Its two conclusions should remain distinct. A warranted new record can support a historical claim that the old summary could not support. Only the additional class-constancy condition permits that claim to be recovered from the old summary alone.

The proof does not manufacture the bridges. Their warrant must identify how the revised criterion fits the earlier event, which rival histories remain possible, and what evidence excludes a newly taught response as the sole source of the later discrimination. A many-to-one comparison  $b$  can legitimately support a coarser historical target while leaving a finer new classification unsupported. Formal existence of  $d_1$  also leaves its practical realization as a justified reading operation to a separate argument. A realization through the scalar query repertoire  $\Gamma_1$  would additionally require a declared coding of the relevant target distinctions.

## 7.5 Criterion Correspondence

Perfect informational discrimination can coexist with a failed interpretation of the labels. For a binary historical feature  $x$ , let the old convention report  $x$  and the revised convention report  $1 - x$ . Both maps are injective. Their induced equality partitions are identical, and an inverse decoding recovers the feature exactly. Nevertheless, reading a new label through the old convention gives the wrong historical value. The correction is to retain the changed convention and use  $d_1(r) = 1 - r$ .

This small case separates criterion correspondence from record resolution. Equality of partitions does not establish equality of the meanings assigned to their classes. The criterion-comparison manuscript already distinguishes injective renaming from changes in use and notes that evaluation maps can differ even when their induced partitions agree [9, pp. 7, 9]. In an actual inquiry, decoder provenance can therefore matter even when no information has been lost and the number of categories remains unchanged.

A second case concerns joint formation. Suppose collaborators in the illustrative task introduce a qualifier distinguishing physical completion from release, supply examples, and practice its use. Later

agreement can establish a current shared distinction under the declared conditions. Earlier participants may have used a corresponding practical contrast, or the encounter may have introduced part of it. These candidate histories can share the same final classified performance. The second line of Equation 14 then requires evidence beyond that final performance if its target concerns the earlier organization.

The responsible inference can remain positive and differentiated. The inquiry may warrant present acquisition of the qualifier, retrospective identification of a recorded release event, and only a tentative attribution of earlier participant understanding. Such a conclusion uses the encounter's achievements without forcing them into one historical claim. It also leaves room for practical distinctions that preceded their present terminology: historical correspondence concerns the selected role and evidence, rather than verbal identity alone.

## 7.6 Revisable Inquiry Records

The algebraic investigation identifies a compact set of dependencies worth retaining in a report: the original target, the selected trace, the earlier and revised readouts, the intervention history, the actual query repertoire, and the grounds for a criterion comparison. Their relevance follows from the argument. An omitted discriminator defeats one inference; an altered decoder convention defeats another; a changed inquiry domain can introduce selection evidence. Recording more material without identifying these dependencies would not necessarily repair the particular gap.

The construction therefore supports a selective account of epistemic improvement. Participation can make a retained distinction usable, supply new evidence, and generate a better question. A historical judgment benefits when the new access is connected to the earlier target by warranted comparisons. Some questions will remain unresolved or become explicitly current-state questions. The subsequent dynamical investigation adds a possible mechanism through which inquiry alters the responses themselves, while preserving the separate task of interpreting what those responses disclose.

## 8 Nonlinear Inquiry Fields

An inquiry can reorganize the response that later serves as its evidence. The algebraic investigation specifies information retained through an encounter but leaves the mechanism of response change open. This section supplies one nonlinear field realization. It defines local response coordinates, coupling and actual inquiry inputs; derives their dynamics from a selected potential; and retains boundary traces when regions are restricted. The subsequent section examines what observations of these fields can establish about their earlier states. The construction follows the inherited requirement to connect a regional field datum, its dynamics and its response record [7, pp. 27–28, 33–35]. Its particular potential is a stipulated model, not a measured law of language or a general theory of interpretation.

### 8.1 Interpreted Response Coordinates

Choose a finite undirected graph  $G = (V, E, w)$  with  $m = |V| \geq 1$ , nonnegative symmetric interface weights  $w_{ij}$ , and zero diagonal weights. An edge has positive weight; absent edges have weight zero. A site identifies a selected local response channel within an inquiry arrangement. Sites can distinguish concurrently modeled channels associated with several task contexts, displays or relations through which a response is prepared. A channel can concern a recorded earlier occasion; its field coordinate describes current response activity concerning that record. The evolution parameter  $t$  orders this modeled activity and does not revise the historical event. The graph need not identify one site with one person or one anatomical location.

At site  $i$ , let  $u_i \in \mathbb{R}$  be a signed amplitude in one declared response comparison. In the illustrative reading, opposite signs select two alternatives in that comparison. Magnitude is a coordinate of the chosen response model. It is not a measure of meaning, knowledge, competence or the legitimacy of either alternative. The sign's relation to a linguistic task must be supplied separately; switching its interpretation during a comparison would change the observation problem.

Let  $u = (u_1, \dots, u_m)$  and let  $p_i(t)$  record the actual external input delivered to channel  $i$  during the inquiry. An intended instruction does not determine  $p_i$  automatically. The amplitude, timing and delivery channel belong to the model's stipulated protocol. For analytical results on a finite interval, assume  $p$  is bounded and piecewise continuous. The interface strength  $\kappa \geq 0$  is fixed within a modeled segment. All quantities are dimensionless after an explicitly chosen normalization; no empirical units are inferred from the numerical examples.

The graph Laplacian is defined by Equation 15.

$$(L_G u)_i = \sum_{j=1}^m w_{ij}(u_i - u_j), \quad u^\top L_G u = \sum_{\{i,j\} \in E} w_{ij}(u_i - u_j)^2 \geq 0. \quad (15)$$

Equation 15 fixes the edge-counting convention: each unordered edge appears once in the quadratic sum. Symmetry makes  $L_G$  positive semidefinite, and  $L_G \mathbf{1} = 0$  for the constant vector  $\mathbf{1}$ . Those properties will matter to both the energy calculation and the finite-perturbation estimates.

## 8.2 Selected Field Potential

The local response law is selected to permit two sustaining response orientations and inquiry-driven passage between them. A quartic local potential together with interface coupling gives Equation 16.

$$E_G(u) = \frac{\kappa}{2} \sum_{\{i,j\} \in E} w_{ij}(u_i - u_j)^2 + \frac{1}{4} \sum_{i=1}^m (u_i^2 - 1)^2. \quad (16)$$

The first term of Equation 16 penalizes differences between coupled channels within the model. The second has minima at  $u_i = \pm 1$ . Choosing these numerical locations is a normalization. The potential has no intrinsic epistemic or normative sign: two low-potential response configurations can support different interpretations, and convergence to either one does not establish warranted understanding.

Taking the negative gradient and adding the actual input yields Equation 17.

$$\dot{u} = -\nabla E_G(u) + p(t) = -\kappa L_G u + u - u^{\circ 3} + p(t), \quad (u^{\circ 3})_i = u_i^3. \quad (17)$$

To derive Equation 17, differentiating an incident edge contribution gives  $\kappa w_{ij}(u_i - u_j)$ ; summing gives  $\kappa(L_G u)_i$ . Differentiating the local quartic gives  $u_i^3 - u_i$ . The negative gradient therefore contains both interface exchange and a nonlinear local restoring term. Neither can be replaced by an unspecified assertion that participation changes a state.

The law represents a particular mechanism of response stabilization. It does not distinguish a meaningful discrimination from stable cue-following without an interpretive bridge. That limit is useful to the inquiry: the same mathematical persistence can be compatible with several semantic accounts. The purpose of choosing a nonlinear sustaining mechanism is to examine how an encounter can leave a durable response after its immediate input has disappeared.

## 8.3 Finite-Time Existence

A polynomial vector field is locally Lipschitz in its state. The remaining existence issue is whether a solution can leave every bounded set in finite time. Proposition 8.1 gives an explicit bound rather than assuming global existence.

**Proposition 8.1** (Bounded Field Evolution). *Fix a finite graph and a time interval  $[0, T]$ . Suppose  $|p_i(t)| \leq M$  for all channels. The input is piecewise continuous, with the solution understood in the integral sense. Choose  $B \geq 1$  with  $B \geq \max_i |u_i(0)|$  and  $B^3 - B \geq M$ . Then Equation 17 has a unique solution throughout  $[0, T]$ , and  $|u_i(t)| \leq B$  there.*

*Proof.* Consider a face with  $u_i = B$ . Every neighboring coordinate is at most  $B$ , so each exchange contribution is nonpositive. The local contribution is at most  $B - B^3 + M$ , which is nonpositive by the chosen bound. At a face with  $u_i = -B$ , each exchange contribution is nonnegative. The local contribution is at least  $-B + B^3 - M$ , which is nonnegative. The vector field therefore points into the closed cube or along its boundary. The usual first-exit comparison, applied on each interval of input continuity, keeps the solution in that cube. One can first use a slightly larger strict bound and pass to its limit if a boundary equality occurs.

Local existence and uniqueness hold on those intervals, with continuous state matching at input jumps. On the resulting bounded cube the polynomial state derivative is locally uniformly Lipschitz and bounded for the bounded input. The solution consequently extends to the whole finite interval. Equivalently, the integral equation gives the same unique absolutely continuous solution, satisfying the law away from jumps.  $\square$

Proposition 8.1 applies on every finite interval on which the input is bounded. It does not impose a common infinite-time bound on an unbounded sequence of external inputs. The source of the bound is explicit: local cubic restoration dominates bounded forcing at sufficiently large amplitude, while the symmetric exchange term points inward at extreme coordinates.

Along a solution, the chain rule gives the energy balance in Equation 18, almost everywhere for a piecewise-continuous input.

$$\frac{dE_G}{dt} = -\|\dot{u}\|_2^2 + p(t) \cdot \dot{u}. \quad (18)$$

Indeed, Equation 17 gives  $\nabla E_G = p - \dot{u}$ , and taking its inner product with  $\dot{u}$  proves Equation 18. The potential decreases without forcing. During inquiry the input term can supply or remove potential, so a decrease cannot be assumed for the forced history. Nor would a decrease establish improving interpretation. It is a consequence of the selected mathematical law.

#### 8.4 Regional Boundary Histories

For a nonempty region  $R \subseteq V$ , let  $L_{G,R}^{\text{int}}$  be the Laplacian formed only from edges with both endpoints in  $R$ . Write  $u_R$  for the restricted coordinate vector. The contribution from edges crossing the boundary is  $b_i(t) = \kappa \sum_{j \notin R} w_{ij}(u_j(t) - u_i(t))$  for  $i \in R$ . The exact restricted equation is Equation 19.

$$\dot{u}_R = -\kappa L_{G,R}^{\text{int}} u_R + u_R - u_R^{\circ 3} + p_R + b_R. \quad (19)$$

Equation 19 follows by splitting the sum in Equation 15 into internal and crossing edges. The term  $b_R$  is an actual trace from the coupled solution. Dropping it defines an isolated regional experiment, not the restriction of the original encounter. An investigator observing one participant's response may similarly need to retain a partner's prompts or an available display to understand the local result. The analogy is interpretive; the exact boundary formula belongs to the stated model.

A regional field datum can now be specified as the time traces  $(u_R, p_R, b_R)$  satisfying the restricted law, together with its initial condition and graph labels. Restriction to a smaller region retains the appropriate subtraces and recalculates the crossing contribution using the retained larger trace. For  $S \subseteq R$ , the exact relation is Equation 20.

$$(b_S)_i = (b_R)_i + \kappa \sum_{j \in R \setminus S} w_{ij}(u_j - u_i), \quad i \in S. \quad (20)$$

Equation 20 follows by splitting the exterior of  $S$  into the exterior of  $R$  and  $R \setminus S$ . Applying the same split twice shows that successive restrictions agree with direct restriction. Overlapping patches must agree on shared state traces and on interface contributions after restriction to the same overlap. Their unadjusted boundary aggregates can differ because their original exteriors differ.

Unique gluing requires more than agreement of arbitrary summary outputs. For a cover retaining all site traces, all graph weights and the actual crossing contributions, matching traces assemble into one

full vector history. Each component equation then agrees with the corresponding regional equation. If the patches retain only response signs, this argument fails: several full trajectories can give the same local signs and different interface effects. The gluing claim is therefore conditional on the declared trace carrier, as the inherited regional formalism requires.

## 8.5 Generated Encounter Structure

The fixed graph describes one articulated segment of an inquiry. Introducing a new comparison surface, participant role or response channel can require a new graph  $G'$ . The history records both the change and a correspondence between retained old sites and selected new sites. An initialization map must specify the new channel values; an input record must specify which previously external contributions have become internal interfaces. The subsequent field law acts on that new carrier.

For example, adding a display that places two documentary sources side by side can create a comparison channel absent from the earlier representation. Recording only a larger old coupling coefficient would conceal that structural decision. Conversely, increasing an existing channel's drive does not by itself justify a claim that a new relational degree of freedom has been generated. The history-bearing construction supplies a place for both operations while preserving their difference.

The piecewise sequence of carriers can be represented by an extended complex with an earlier anchor and newly attached encounter cells. The fixed-graph existence result applies separately on each segment. A law for choosing all new carriers, labels and initialization maps has not been derived here. This is an explicit boundary of the present field investigation: it examines a selected response mechanism within a generative historical architecture, leaving unrestricted formation of new operations and meanings open.

## 9 Field Evidence Limits

The nonlinear field law makes it possible to compare a persistent later response with the history that produced it. This section derives a sufficient inquiry pulse for a change of response regime, proves a finite-amplitude contraction estimate, and separates three sources of inverse ambiguity: coarse readout, observational error and omitted input history. The results concern the selected field of Section 8. Their philosophical use is to expose premises that an interpretation of elicited success must supply; no response amplitude is treated as a direct measure of understanding.

### 9.1 Homogeneous Response Regimes

Suppose every site starts at the same amplitude  $s(0)$  and receives the same input  $P(t)$ . Since  $L_G \mathbf{1} = 0$ , uniqueness implies that the uniform sector remains invariant. Equation 21 is its restricted law.

$$u(t) = s(t)\mathbf{1}, \quad \dot{s} = s - s^3 + P(t). \quad (21)$$

Equation 21 is derived from the full spatial system. It is not a replacement of the inquiry or its semantic content by one scalar. The restriction allows a transparent calculation of one mechanism, while the following perturbation estimate returns to all finite field directions.

With  $P = 0$ , the homogeneous equilibria are  $s = -1, 0, 1$ . For  $0 < s < 1$  the derivative is positive, and for  $s > 1$  it is negative. Hence every positive scalar initial state tends to 1; the negative case tends to  $-1$  by symmetry, while zero stays zero. For  $s(0) \neq 0$ , direct integration gives Equation 22.

$$s(t) = \frac{s(0)}{\sqrt{s(0)^2 + (1 - s(0)^2)e^{-2t}}}. \quad (22)$$

To derive Equation 22, set  $z = s^2 > 0$ . Its equation is  $\dot{z} = 2z(1 - z)$ . The reciprocal satisfies  $d(1/z)/dt = -2(1/z) + 2$ , which has solution  $1/z(t) = 1 + (1/z(0) - 1)e^{-2t}$ . Taking the square root with the initial sign gives the stated formula.

The full field linearization at either uniform  $\pm 1$  is  $-\kappa L_G - 2I$ , where  $I$  is the  $m$ -dimensional identity. If  $\lambda_j \geq 0$  is a Laplacian eigenvalue, the corresponding linearized eigenvalue is  $-2 - \kappa\lambda_j < 0$ . These homogeneous equilibria are consequently locally stable against spatially nonconstant as well as constant perturbations. At zero the constant mode has eigenvalue 1, so zero is unstable. This local calculation does not classify all nonuniform equilibria or their basins. A finite-perturbation result below gives a different and more explicit stability domain.

## 9.2 An Inquiry-Induced Transition

A sufficiently strong finite positive pulse can move a negative uniform response into the positive unforced basin. The numerical boundary used in the proof is derived from the chosen cubic. It is not a critical value of linguistic understanding.

**Proposition 9.1** (Sufficient Uniform Pulse). *Let  $-1 \leq s(0) < 0$  and apply a constant uniform input  $P > 2/(3\sqrt{3})$  for a duration  $T > 1/(P - 2/(3\sqrt{3}))$ . Then  $s(T) > 0$ . If the input is zero after  $T$ , the uniform field approaches 1.*

*Proof.* On  $[-1, 0]$ , the function  $s - s^3$  reaches its minimum  $-2/(3\sqrt{3})$  at  $s = -1/\sqrt{3}$ . This follows by differentiating:  $1 - 3s^2 = 0$ , and comparison with the endpoint values gives the minimum. Thus, while the trajectory lies in that interval, its derivative is at least  $\delta = P - 2/(3\sqrt{3}) > 0$ . It cannot exit below  $-1$ , where its derivative is  $P > 0$ . Integrating the lower bound shows that it reaches zero within time at most  $1/\delta$ . At zero its derivative is again  $P > 0$ , and uniqueness prevents a return through zero while the same positive input is applied. The strict duration therefore gives  $s(T) > 0$ . After withdrawal of the input, Equation 22, shifted to initial time  $T$ , proves convergence to 1.  $\square$

Proposition 9.1 establishes a sufficient pulse, not the least input or shortest time for any particular initial value. An initially positive response also stays positive under the same nonnegative pulse. Reading only the later sign can therefore give the same observation for opposite earlier signs under an identical inquiry protocol. Persistent success after withdrawal of the prompt does not, in this example, separate disclosure from inquiry-induced change.

Figure 2 shows the stipulated uniform comparison. The unforced negative history serves as a comparison trajectory within the model. It is not an observed counterfactual for an actual participant. A practical study would need separate grounds for its intervention model and its comparison conditions.

The result also qualifies a common use of transfer. A response that persists after immediate prompting can be evidence of a newly sustained organization. Its persistence supplies no automatic date of acquisition. If the claim concerns present availability, the observation can be relevant. If the claim concerns antecedent organization, the inquiry must consider whether its own input could have induced the change. This is a mechanism-specific realization of the earlier/current query distinction inherited from the uptake investigation [11, Section 7].

## 9.3 Finite-Amplitude Contraction

The uniform calculation does not establish behavior for arbitrary spatial perturbations. A stronger restricted statement is available in a positive rectangle. Let  $1/\sqrt{3} < a \leq 1$ ,  $b \geq 1$ , and suppose  $0 \leq p_i(t) \leq M$  with  $b^3 - b \geq M$ . At the lower face  $u_i = a$ , exchange is inward and  $a - a^3 + p_i \geq 0$ . At the upper face  $u_i = b$ , exchange is inward and  $b - b^3 + p_i \leq 0$ . Hence  $[a, b]^m$  is forward invariant. The condition  $a \leq 1$  is material; nonnegative input alone would not give this lower-face conclusion for  $a > 1$ .

**Proposition 9.2** (Finite-Amplitude Field Contraction). *Two solutions  $u, v$  of the same graph law, with the same input and initial conditions in the preceding rectangle, satisfy Equation 23.*

$$\|u(t) - v(t)\|_2 \leq e^{-(3a^2-1)t} \|u(0) - v(0)\|_2. \quad (23)$$

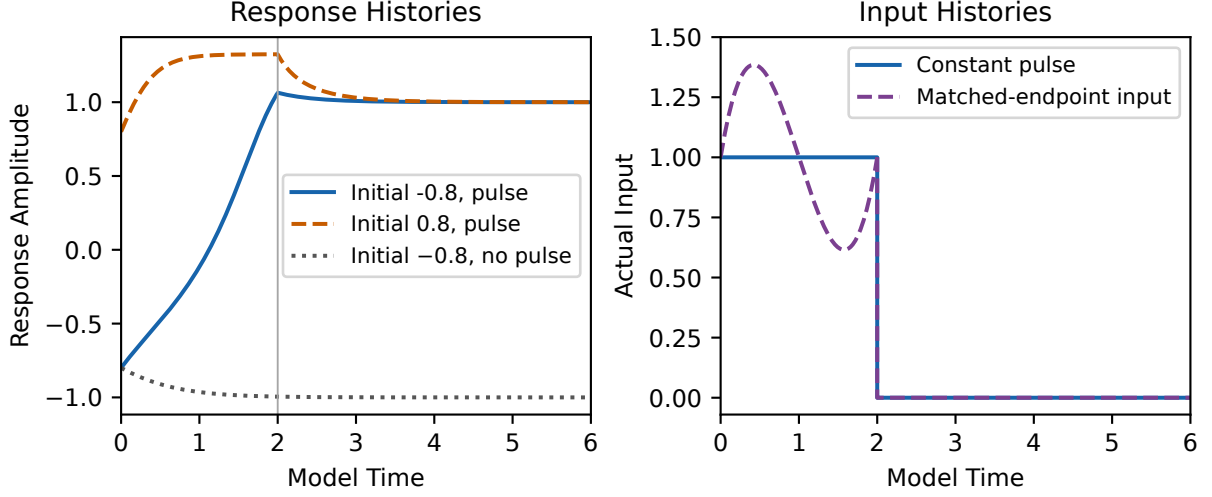


Figure 2: Illustrative Inquiry Pulse. Two initial response orientations receive the same finite input and subsequently occupy the positive response regime. The second panel records the actual modeled input and an exact alternative input history used later in the section. The coordinates and times are dimensionless, with no empirical calibration.

*Proof.* Put  $d = u - v$ . Subtract the equations. Since  $u_i^3 - v_i^3 = (u_i - v_i)(u_i^2 + u_i v_i + v_i^2)$ , the difference satisfies Equation 24.

$$\frac{1}{2} \frac{d}{dt} \|d\|_2^2 = -\kappa d^T L_G d + \sum_i (1 - u_i^2 - u_i v_i - v_i^2) d_i^2 \leq -(3a^2 - 1) \|d\|_2^2. \quad (24)$$

The inequality in Equation 24 uses positive semidefiniteness of  $L_G$  and  $u_i, v_i \geq a$ . Multiplying the squared norm by  $e^{2(3a^2-1)t}$  gives a nonincreasing quantity. Taking square roots proves Equation 23, including the case of coincident initial states.  $\square$

Proposition 9.2 is a nonlinear finite-amplitude estimate on a declared domain. It does not follow merely from stability of one homogeneous linearization. With zero input, one may choose  $v = \mathbf{1}$  and conclude that every initial state in this rectangle converges to  $\mathbf{1}$ . With a common time-varying input, the estimate compares two histories receiving that same input; it does not claim convergence to the unforced equilibrium.

Figure 3 illustrates the full three-site comparison. The upper bound depends on the chosen invariant rectangle, so it need not be sharp. Its interpretive role is to specify a sufficient loss of discrimination at a declared error scale, not to infer an epistemic value from the contraction rate.

#### 9.4 Finite-Resolution Observation

For a fixed input and graph, distinct initial states cannot become exactly equal at a finite time under this law. Suppose they did coincide at time  $T$ . On the bounded interval supplied by Proposition 8.1, reverse the time parameter and use the same recorded input in reverse order. Local uniqueness for the reversed differential equation gives equal solutions backward along the interval, contradicting distinct initial states. This argument needs existence only along the already bounded trajectories; it asserts no global inverse for arbitrary terminal states.

Contraction and finite-time injectivity therefore coexist. An exact endpoint with an exact known law and input can determine an initial state on the realized flow image. The inverse can nevertheless be poorly conditioned. Equation 23 makes the distance ratio of an inverse on a distinct pair at least  $e^{(3a^2-1)t}$ . Small endpoint differences can correspond to much larger earlier differences. This is an information problem at a declared resolution, not destruction of the modeled historical trajectory.

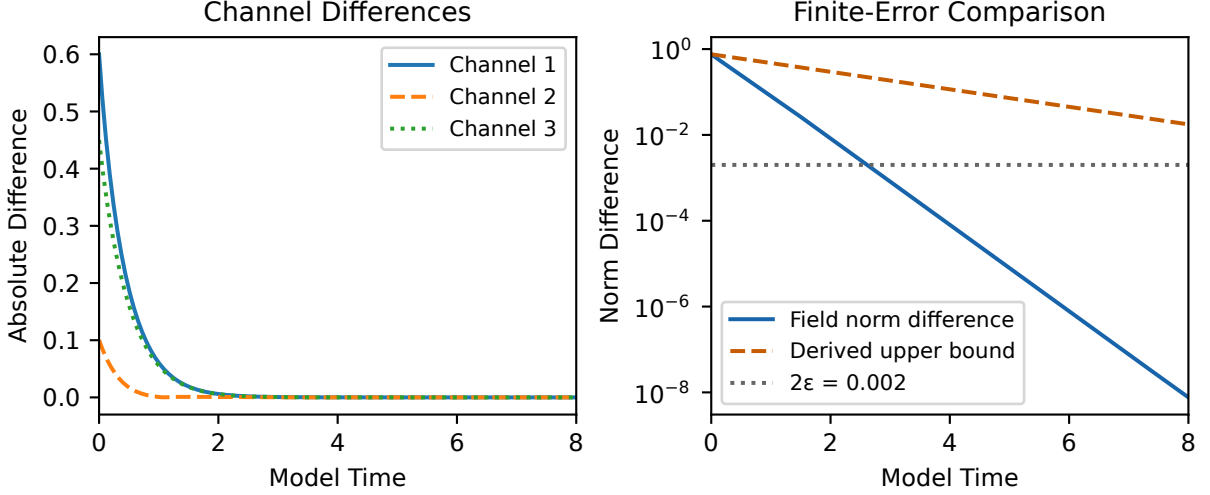


Figure 3: Finite-Resolution Field Comparison. Nonuniform initial fields evolve on a three-site interface graph. The norm difference remains below the derived nonlinear bound. The marked error scale is chosen for the numerical illustration and represents overlapping error balls, not a universal threshold or guaranteed equality of rounded records.

To state the observation consequence precisely, suppose an endpoint measurement has an unknown additive error of Euclidean norm at most  $\varepsilon > 0$ . Write  $B_\varepsilon(v) = \{z \in \mathbb{R}^m : \|z - v\|_2 \leq \varepsilon\}$  for the closed error ball. Two states  $u, v$  have overlapping possible measurement sets when  $\|u - v\|_2 \leq 2\varepsilon$ . Their midpoint then lies in both error balls; conversely the triangle inequality requires that bound whenever the balls intersect. Combining this fact with Equation 23 gives the sufficient condition in Equation 25.

$$e^{-(3a^2-1)t} \|u(0) - v(0)\|_2 \leq 2\varepsilon \implies B_\varepsilon(u(t)) \cap B_\varepsilon(v(t)) \neq \emptyset. \quad (25)$$

Equation 25 means that at least one permitted measurement cannot separate the pair. It does not say that every noisy measurement agrees, or that a particular rounding rule places the two values in the same bin. A statement about statistical error probabilities would require an error distribution in addition to this deterministic bound.

## 9.5 Omitted Input Histories

An exact endpoint can also fail to identify the earlier state when the actual input is not retained. The following comparison has no observational noise. On any graph, let  $u_A(t) = \mathbf{1}$  with  $p_A = 0$ . For  $0 \leq t \leq 2$ , define the uniform alternative in Equation 26.

$$u_B(t) = (-1 + t)\mathbf{1}, \quad p_B(t) = [1 - (-1 + t) + (-1 + t)^3]\mathbf{1}. \quad (26)$$

Substitution into Equation 17 verifies Equation 26 exactly: the graph term vanishes, and the chosen input makes the derivative equal to  $\mathbf{1}$ . On the interval the scalar input is positive, since its minimum is  $1 - 2/(3\sqrt{3}) > 0$ . Both histories end at  $\mathbf{1}$ , although they start at opposite uniform orientations. Setting both inputs to zero afterward makes their subsequent endpoint dynamics identical.

This equality does not contradict fixed-input injectivity. The inputs differ, and the full histories retain that difference. An endpoint-only record erases precisely the evidence relevant to the comparison. The constructed input is an existence witness, not a claim that investigators can program a participant's response trajectory. Its lesson is conditional: a law and final state do not identify an origin across unrestricted unrecorded inputs.

Retaining the actual input can remove this particular ambiguity if the law, graph and measurement are also known with the required precision. In an empirical linguistic inquiry, those premises can remain disputed. The appropriate conclusion is then the set of historically supported alternatives, rather than either a categorical restoration claim or a universal impossibility result.

## 9.6 Interpretive Consequences

The field investigation establishes three different limits with distinct remedies. A sign readout can merge states that an accurate amplitude record separates. Finite measurement error can make a mathematically injective inverse unreliable. An omitted input history can permit exact endpoint equality across distinct origins. Increasing endpoint precision addresses the first two only under suitable conditions; it cannot by itself supply an unrecorded intervention.

These mathematical distinctions clarify the philosophical account without deciding its semantics. A persistent response may support a claim about current availability. A pre-encounter attribution requires a bridge to earlier organization. A field regime can be sustained by an initially misunderstood cue, while a participant's justified disagreement can break response alignment. The positive and negative basins have no intrinsic status as correct and incorrect understanding.

The worked inquiry can therefore use the field example as a question-generating comparison: what was supplied, what persisted, what was actually recorded, and which historical alternatives remain? Establishing the relevant linguistic mechanisms requires further evidence. The formal result is valuable because it keeps those obligations separate, including a positive account of the conditions under which a restricted inverse claim would succeed.

## 10 Inquiry Comparison

The preceding constructions distinguish several ways an encounter can change its evidence. This section develops those distinctions through one fictional editorial inquiry. Its sequence, source materials and participant responses are stipulated for conceptual comparison. They are not a report of fieldwork or a claim about any language community. The purpose is to determine which findings follow from different possible records of the same kind of collaborative task. The comparison connects the historical carrier, the evidence algebra and the nonlinear field example without treating them as interchangeable descriptions.

### 10.1 The Initial Attribution

A small oral-history project prepares captions for a public display. Its materials include a recorded recollection, a dated administrative document and a later editorial note. A narrator recalled that a community meeting occurred after a flood. The administrative document dates that meeting to a particular month. An investigator writes a caption attributing both the sequence and the month to the narrator. An editor objects to the attribution while accepting the proposed date. The investigator initially codes the objection as a correction of factual content.

The initial code makes a testable interpretive commitment: it treats the truth of the proposed date as the relevant source of disagreement. Checking the administrative document consequently appears to settle the issue. The editor's continued objection is evidence that this description omits something. It does not by itself determine whether the omitted issue concerns source attribution, the narrator's permission, public presentation or another consideration. A useful inquiry must distinguish these possibilities rather than replace one unexamined label with another.

The investigator asks the editor to compare two revised captions. One retains the date but attributes it explicitly to the administrative document. The other deletes the date while continuing to imply that the narrator established the chronological sequence independently. The editor accepts the first attribution and asks for qualification of the second. This response makes source standing a live explanatory candidate. Further discussion locates the difficulty in what each source supports, although permission and public presentation remain separate questions.

The comparison has acquired more evidence than a single accepted caption would supply. It varies the relevant relation between a statement and its source while partly holding factual content fixed. Nevertheless, it remains a supported interaction. The investigator has selected the alternatives, the editor has

explained a contrast, and the task has become more explicit during the exchange. These contributions belong in the interpretation of the result.

The initial positive finding is correspondingly narrow. In this episode, factual agreement does not exhaust the editor's reasons for correcting the caption. The differentiated responses support an attribution-sensitive interpretation. They do not establish the editor's competence across all documentary genres, the distribution of the practice throughout the community or the investigator's prior understanding. Each of those larger claims would introduce a new bearer, comparison class or temporal target.

## 10.2 Retained Contrasts

Suppose the project has preserved an earlier exchange concerning another caption. Its summary reads *caption corrected*. An accompanying recording retains the rejected wording, the editor's objection and the explanation that a source supported the event without supporting its stated date. The investigator had previously read this exchange as another factual disagreement.

After the present encounter, the investigator re-examines the earlier record. The source-standing interpretation now organizes features that the old coding grouped together: the editor accepted the date, objected to its attribution and proposed a separate source note. The present learning has changed the investigator's available readout. The earlier recording and the earlier event have not thereby changed. This is the practical distinction between retained discrimination and available interpretation developed in Section 4.

The revised historical attribution gains support from the recorded sequence. Its warrant does not rest entirely on the editor's present retrospective report. The retained contrast supplies a reason for thinking that the earlier activity already differentiated source standing from factual accuracy. The present report helps identify that reason, while the old record constrains what can be attributed to the earlier encounter.

Now change the record condition. Suppose only the common summary survives. An exchange correcting an inaccurate date and an exchange correcting the attribution of an accurate date can both generate *caption corrected*. Learning a more refined interpretive scheme does not determine which exchange occurred. The problem is not remedied by the investigator's confidence in the new vocabulary. Independent testimony, another retained trace or an additional historical argument would be needed.

These alternatives correspond to different record fibres. In the richer record, a relevant discriminator may be present even before the investigator can use it. In the summary, that discriminator may be absent. The query transport results in Section 7 identify the difference mathematically: a historically relevant query can fail to factor through the selected old record even when a later, richer record supports it. This failure concerns that recording choice and that query. It does not establish a general defect of archival inquiry.

Both alternatives permit positive findings. The richer record can support a bounded attribution to the earlier practice. The summary can still establish that a revision was recorded, and present interaction can still establish the editor's current differentiated responses. Reporting these findings separately preserves the knowledge obtained while identifying the missing historical bridge.

## 10.3 Acquired Discrimination

The investigator next prepares captions for two additional entries. In the first, an independent document makes a proposed statement factually credible, but the named narrator did not make it. In the second, the narrator did make the statement, while the document supplies a reason to question its accuracy. The investigator distinguishes these cases without being given the editor's preferred wording.

This performance supports a present discrimination between attribution and factual assessment. The paired cases matter because they interrupt the shortcut that an acceptable caption is simply one containing a credible statement. They also interrupt a narrower shortcut that every objection can be answered by deleting the disputed phrase. The investigator instead explains what each source supports and proposes a corresponding revision.

The inference remains bounded by the supports that remain available. The source documents, the recently discussed examples and the editorial task itself are still present. The observation supports an acquired ability within that arrangement. It does not automatically establish unaided long-term competence or successful transfer to every kind of testimony. Removing all supports would change the target activity and might discard part of the very practice whose acquisition matters.

A claim about antecedent investigator understanding would be particularly weak. The initial misclassification and the subsequent explanation supply a plausible learning history. Later success can coexist with an earlier inability to distinguish the two concerns. One cannot use the final performance as an unchanged indicator of both stages simply because the investigator is the same person. Historical identity does not imply an invariant interpretive capacity.

The field examples clarify this inferential caution at a different representational level. A specified input can move a response profile into another stable sector; persistence after withdrawal does not reconstruct the initial sector. The caption inquiry is not thereby shown to obey the quartic field law. Its linguistic interpretation rests on the stipulated contrasts and the recorded learning sequence. The field supplies a countermodel to an unrestricted inference from durable final performance to antecedent state, rather than an empirical explanation of this editor or investigator.

Conversely, the field's contraction result should not turn all similar final performances into exact historical equivalence. Under the fixed law, known input and exact full-state observation, finite-time trajectories remain distinct. The comparison should state whether its uncertainty comes from a coarse response category, finite observational resolution, an unrecorded input or an unjustified model. These explanations imply different possibilities for improving the inquiry.

#### **10.4 A Newly Adopted Qualifier**

A third entry exposes a difficulty that neither existing caption format handles well. The recollection supplies an event sequence, the document supplies a date range, and an editorial inference connects them. The collaborators propose a qualifier indicating that the caption combines sources rather than reproducing any single testimony. They examine several formulations and provisionally adopt one for this display.

The qualifier is a locally produced outcome. Its introduction depends on an inherited source-standing distinction, the investigator's newly acquired discrimination and the narrator's concern about being represented as having supplied a precise chronology. Those contributions can be historically distinguished without treating them as independent objects added to an otherwise complete meaning. The narrator's objection changes what the proposed qualification needs to accomplish.

The achievement supports a present claim about the adopted annotation. Participants can explain which attribution it makes, identify cases it handles and specify a case for which it remains inadequate. This is knowledge of a developing practice, although the practice was partly formed through the inquiry that studies it. Its formation does not make the knowledge fictitious.

The historical extension of that claim needs restraint. The earlier record can support practical differentiation between testimony and inference without supporting the existence of this particular qualifier. The qualifier can express an inherited concern while adding a new reporting convention. A claim that the whole scheme merely uncovers an unchanged antecedent system would need evidence beyond the scheme's present usefulness.

Nor does shared adoption establish universal adequacy. A translator points out that one formulation suggests agreement among sources even when their claims remain partly incompatible. The collaborators revise its intended use and leave the disputed entry unresolved. This disagreement improves the account by exposing a consequence that the first successful examples did not test. The investigation's positive result includes the newly identified limitation.

Table 2: Scoped Findings In The Constructed Caption Inquiry

| Selected Finding                  | Discriminating Ground                                                                                     | Remaining Limit                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Earlier editorial distinction     | The retained sequence separates attribution correction from factual correction.                           | The record does not establish the later annotation vocabulary or its community-wide distribution. |
| Investigator learning             | Initial misclassification is followed by explanation and differentiated treatment of contrasting entries. | Present supported performance does not establish antecedent or durable unaided competence.        |
| Local qualifier formation         | Recorded proposal, objections, revision and bounded subsequent use.                                       | Adoption does not establish general adequacy or an unchanged ancestral convention.                |
| Unresolved historical attribution | The only old record merges two relevant kinds of correction.                                              | A new vocabulary alone cannot select the missing earlier sequence.                                |

## 10.5 Historical Comparison

Table 2 collects the distinctions made by the constructed episode. Its rows are compatible findings rather than stages in a ranking from weak to complete knowledge. Each finding has its own bearer, temporal location and evidential dependency. The table's unresolved alternatives indicate what a stronger attribution would still need to address.

The historical two-complex can represent the different sequences of questioning, explanation, correction and later response. Its comparison cell records a relation between selected routes. A common final caption supplies a possible coarse endpoint for those routes, while their histories remain different. The boundary identity of the complex organizes this representation; it does not assert that questioning before explanation has the same epistemic effect as questioning after explanation.

The operator construction then asks which earlier targets survive an admitted extension and which outputs depend on the chosen record. It can represent the preservation of the earlier source record while a later query becomes usable. Historical anchoring and record accessibility remain distinct: an old event can retain its identity while the available summary fails to discriminate a selected feature of that event.

The field construction represents another selected aspect: response dynamics during a specified encounter with explicit inputs and boundary exchange. It can show how initially different response profiles approach one another or how a forcing history changes the subsequent sector. It cannot supply the semantic interpretation of source attribution from a sign or equilibrium alone. The case therefore requires a philosophical and linguistic account in addition to the mathematical representation.

Keeping these roles distinct prevents an apparent formal synthesis from outrunning the argument. The same inquiry can admit a historical representation, a record algebra and a restricted response model. Their common application does not prove that they are mutually derivable, exhaustive or empirically identified. A future integrated model would need explicit maps connecting its measured responses, historical operations and interpreted queries.

## 10.6 Unavailable Evidence

Finally, suppose one underlying recollection is not available for further research use. The project can report the access limit and the reasons it constrains an attribution without treating refusal as a failure of understanding. The absence of permission concerns what the investigator may obtain. It does not by itself determine what the narrator knows, what the record contains or what the earlier practice was.

The practical consequence can be a narrower historical claim. The investigator may retain adequate grounds for a present editorial distinction while lacking distributable evidence for a stronger antecedent

attribution. A public account can state that limit, identify the accessible grounds and preserve the unresolved issue. It should not imply that every reader has received evidence that cannot in fact be shared.

Some inquiry dependencies can be documented without exposing the protected content. A permitted record of the task sequence may establish that explanation preceded the investigator's new performance. That temporal fact can qualify an antecedent-learning claim even when the source wording remains unavailable. Whether such a record may be retained is itself a condition of the particular collaboration, rather than a permission inferred from its methodological usefulness.

The resulting inquiry can be epistemically productive while remaining incomplete. It has clarified a prior distinction, documented investigator learning, supported a provisional local annotation and specified a historical question that the accessible evidence cannot settle. Its incompleteness is intelligible because the findings have been separated. The next section considers how participant correction and disagreement contribute to judging such an account.

## 11 Participatory Adjudication

Participants can challenge an inquiry's descriptions as well as supply responses within them. Their interventions create an additional evidential task: assessing whether a correction changes an answer, the relevant classification or the question itself. This section develops a limited account of participatory adjudication, understood as reasoned assessment of such competing interpretations. It examines participant correction, differentiated epistemic positions, contested categories and inquiry limits, then identifies the form of a supported finding. The account concerns the warrant of an inquiry's claims; it supplies no general allocation of authority over a linguistic community.

### 11.1 Interpretive Correction

A participant's correction can have several objects. The participant may deny a factual description, clarify a remembered intention, reject the investigator's paraphrase or explain that a response has been classified under an inappropriate category. These interventions bear on different parts of the inference. An inquiry becomes more answerable when it identifies which part the correction challenges.

Suppose the editor in the caption collaboration rejects the description that a speaker was uncertain. The editor explains that the speaker expressed confidence in an event while objecting to its attribution to one named source. The correction challenges the investigator's interpretation of the exchange. Its force depends on the recorded sequence, the editor's contribution to that sequence and the adequacy of the proposed alternative. Treating the intervention merely as another uncertain response would preserve the classification at the cost of insulating it from the evidence.

The correction can also expose a task mismatch. A participant asked to choose the most accurate caption may be assessing whether the caption can responsibly be issued in the speaker's name. If the investigator treats that assessment as a factual error, the recorded outcome loses its intended interpretation. The appropriate response is to examine what question the participants were actually answering and which question the resulting evidence can support.

This possibility does not make the participant's correction infallible. It establishes its relevance. A participant may offer a retrospective explanation that conflicts with earlier conduct or with another participant's experience. The inquiry should then examine the conflict through the reasons and evidence appropriate to the target. Accepting a correction without examination and ignoring it by design can both prevent the comparison the claim requires.

The inherited semantic-bridge account already allows participant disagreement to challenge content classifications, response criteria and correction standards [11, Sections 5,10–11]. The present account places those challenges inside the history of an evolving inquiry. An effective correction can improve the investigator's competence, alter the record and narrow the claim. Recording these consequences makes the correction part of the explanation of what the inquiry learned.

## 11.2 Differentiated Epistemic Positions

Participants can possess different grounds for their interpretations. Someone who issued a statement may have distinctive access to its intended point. An interlocutor may identify consequences or ambiguities the speaker did not anticipate. An editor may understand the collection's recording convention, while a later reader notices that the convention communicates poorly outside the original collaboration. These contributions need comparison at the level of the question each addresses.

The distinction between intention and uptake is particularly consequential. A speaker's explanation can support what the speaker sought to express while leaving open how another participant understood it. The recipient's report can supply evidence of experienced significance while leaving open the speaker's intention or an institution's applicable procedure. Combining these reports should preserve their different objects. Agreement may strengthen a particular inference; disagreement can reveal the relation that requires explanation.

Practical expertise has a similarly bounded role. An experienced editor may identify a consequential source distinction that a novice misses. That asymmetry can support instruction and improve the investigation. It does not confer unrestricted authority to define what every participant meant or which objection deserves consideration. A claim about competence in a selected practice should identify the range within which the expertise bears on the inquiry.

The normative-formation manuscript already distinguishes generative capacity from realized influence and treats expertise as a heterogeneous source whose effects depend on its relations with other sources [6, Sections 3–4]. Applied here, that distinction helps separate a participant's ability to illuminate a case from the practical ability to make that interpretation official. The most influential account may be well supported, weakly supported or supported only for one of the inquiry's targets. Influence alone does not decide among these possibilities.

The investigator likewise occupies a differentiated position. Comparative records or formal tools can reveal relations that a participant has not encountered. Their relevance still requires interpretation. An external comparison can expose an inconsistency in a coding scheme, yet its categories may fail to fit the local practice. Reasoned assessment permits the investigator and participants to contribute distinct grounds while making each contribution answerable to its scope.

Leonard and Haynes examine collaborative inquiry in which research questions and assumptions about speakerhood themselves become subjects of negotiation [13, pp. 279–290]. Their locally situated discussion gives a concrete reason to preserve both community and technical contributions. It does not supply a universal definition of speakerhood or a rule that collaboration resolves every interpretive disagreement.

## 11.3 Contested Categories

Some disputes concern the vocabulary through which answers become possible. Participants may agree on the recorded words while disagreeing about whether a revision counts as factual correction, editorial authorization or a new interpretation. Resolving the dispute requires more than collecting another answer within the disputed categories. The inquiry needs to examine what each classification retains and what its use would imply.

A productive comparison begins with a concrete difference. If two proposed classifications assign different status to the same correction, identify a case in which those assignments support different expectations or historical descriptions. One scheme may explain why an editor accepts a sentence for internal discussion but rejects its public attribution. Another may explain only whether the sentence is judged true. Both can organize legitimate questions, while only one may address the original inquiry's concern.

The comparison can therefore yield a differentiated result. The investigator may retain one category for a factual analysis and another for a source-attribution analysis. It should then identify the interface between the two. Reusing the same label for both without recording the difference would create apparent agreement by erasing the object of the dispute.

The preservation taxonomy already treats identification bases, tolerances and evidential burdens as historically generated configurations [8, Section 13]. Its relevance extends beyond preservation terminology. An inquiry's categories can have a history, acquire practical force and remain open to evaluation. Recognizing that history does not make the categories arbitrary. It creates an obligation within the argument to explain why the selected basis is adequate to the question.

Category revision can also change the surrounding practice. A new annotation may alter which objections remain visible, who must be consulted or how an uncertain claim travels to later readers. These effects belong to the history of the inquiry when they occur. Their possibility should not be used to infer that every analytical category automatically reorganizes social life. The relevant mechanism is its actual uptake through specified practices, interfaces or decisions.

Participant disagreement can remain reasoned after these comparisons. A record can present the shared observations, the alternative descriptions and the consequences of each interpretation. This outcome offers more epistemic content than either forced consensus or an undifferentiated declaration of irresolvable disagreement. It identifies where the accounts coincide, where they diverge and which additional grounds would bear on the divergence.

## **11.4 Inquiry Limits**

The evidential value of an additional encounter does not establish a right to obtain it. A test might discriminate competing interpretations while requiring disclosure, labor or participation that has not been agreed. The formal capacity to describe the test settles an analytical possibility. Its performance requires a separately justified relation with the people and materials involved.

Refusal accordingly has a bounded evidential role. It establishes that the requested participation did not occur in the observed form. Depending on the record, it may also supply reasons about the request, the relation or the stakes of disclosure. It does not by itself identify misunderstanding, incapacity or the falsity of the interpretation under investigation. Several histories may remain compatible with the same refusal.

This limit can alter the form of the finding. An investigator may report that an antecedent interpretation remains unresolved because the permitted record does not separate the relevant accounts. The inquiry can still establish a current disagreement, a documented use or the limits of a particular representation. Restricted access need not make every claim unavailable; it changes which claims the evidence supports.

The reconstruction manuscript's condition-bearing trace includes restrictions, known absences and revision history alongside provenance [10, Section 9.2]. That arrangement illustrates a useful distinction between preserving a reason for an evidential gap and eliminating the gap. A record can responsibly state that particular material was unavailable without pretending to know what it would have established.

The investigator should also distinguish an unperformed test from a failed performance. A person who declines an interview has not thereby attempted and failed its linguistic task. A recording that cannot be accessed has not thereby shown an absence of the recorded distinction. Such differences belong in the observation account whenever the inquiry's alternatives depend on them. Merging them can produce apparent certainty through the loss of relevant information.

The proposed position supports proportionate inquiry. Additional demands should have an articulated connection to the claim and the live alternatives, while their acceptability remains a further question. The earlier uptake study already identifies repeated testing as a possible burden and treats the possibility of further discrimination as an open research horizon rather than an unlimited entitlement [11, Section 10]. This paper retains that boundary.

## **11.5 Reasoned Findings**

A participatorily informed finding should state the claim, the contributions on which it relies and the effect of substantive corrections. These elements provide a readable explanation of how the inquiry

reached its present position. They do not require every participant to endorse a single final statement or every recorded disagreement to receive equal weight.

For the caption collaboration, a finding might establish that the editor used a source-standing distinction before the investigator learned its relevance, while the joint annotation format emerged during the collaboration. The grounds could include dated earlier corrections, the instructional sequence and differentiated use of the new format. The account should identify whether another participant contests the interpretation of the earlier corrections and how that contestation affects the historical claim.

A weaker finding can also be definite. The inquiry may establish the present local use of the annotation while leaving its antecedent practical basis unresolved. That finding describes an actual achievement and its historical limit. It avoids forcing the relation into either complete disclosure or complete invention when the retained evidence does not support that choice.

The institutional treatment of the finding creates another question. A research report may authorize a public description, but the adequacy of its interpretation remains open to criticism. Conversely, a well-supported interpretation does not by itself authorize every use of the underlying material. The taxonomy's separation of identification, epistemic valuation and normative judgment supplies the inherited basis for keeping these steps explicit [8, Section 13].

The local proposal is therefore to make consequential attribution answerable through reasons, accessible evidence at the permitted level, recorded revision and a clear account of unresolved alternatives. Its success depends on the inquiry's actual organization. Formal permission to comment may accomplish little when the relevant classification cannot be challenged or when correction has no route into the maintained record. The normative-formation account's distinction between nominal and effective contestability clarifies that possibility [6, Section 14].

Participatory adjudication adds this practical history of assessment to the earlier account of encounter warrant. The investigator's interpretation becomes stronger when relevant correction can change it for stated reasons. The result can remain partial, plural or contested while supporting a precise claim. Broader objections about circularity, model scope and the reach of historical evidence require the further analysis that follows.

## 12 Warrant Objections

The proposed account makes historical targets, interpreted records and inquiry transformations explicit. Its value depends on whether those distinctions improve an argument rather than merely redescribe its assumptions. This section examines four objections at that level: question-begging historical bridges, a measurement-error interpretation of participation, arbitrary choice of records and the explanatory role of the formal models. Each objection identifies a genuine failure condition. The replies retain narrower positive claims while acknowledging where the account supplies no independent warrant.

### 12.1 Question-Begging Bridges

The historical decoder in Section 7 requires a faithful relation between a revised classification and an earlier target. An objection immediately follows: if that faithfulness already asserts that the interpretation is historically correct, proving that the decoder returns the correct historical value appears to assume the desired conclusion. Naming the assumption a bridge does not remove the circularity.

The objection succeeds against using the conditional proposition as evidence that the bridge holds. The proof establishes the consequence of a supplied correspondence. Its practical contribution is to identify the premise that an inference must defend and to separate that premise from record sufficiency. An investigator can possess a highly discriminating record while misinterpreting its categories. Conversely, a sensible interpretation can remain unsupported because the record omits the required distinction. These failures call for different responses.

Positive historical warrant therefore needs grounds beyond the endpoint that motivated the attribution. In the constructed caption inquiry, an independently dated correction can show the editor distinguishing

factual support from source attribution before the investigator introduced the new qualifier. That evidence bears on the antecedent practical distinction. It need not establish the earlier existence of the qualifier or every participant's understanding. The historical claim gains support because the evidence has a temporal and interpretive relation that differs from the later jointly produced success.

Such independence is local. The investigator still interprets the dated correction through present concepts, and the dating itself rests on records or other grounds. The relevant requirement is that the supposed support does not simply restate the observed endpoint under a label that already contains the conclusion. Examining what would count against the attribution helps expose that dependence. Evidence that the disputed source contrast first appeared in the investigator's instructional materials would challenge the proposed historical bridge.

Some encounters will offer no such discrimination. Suppose the old source is unavailable, the intervention teaches every tested contrast, and the only surviving record is the later successful performance. If antecedent understanding and newly acquired understanding both fit that record, the account supplies no reason to choose between them merely because a decoder can be stipulated for one model. Present learning may be supported while the historical attribution remains unresolved. Accepting that outcome is necessary to preserve the conditional result's epistemic meaning.

## 12.2 Participation Effects

A second objection holds that participation introduces an ordinary measurement problem. An investigator changes the conditions of observation, responses vary, and an adequate measurement model should correct or represent that variation. Introducing a historically relational framework may add vocabulary without adding explanatory substance.

For some targets, this objection identifies an adequate simpler account. If the question concerns a stable recorded feature and the relevant uncertainty comes from transcription or instrumental error, a well-justified measurement analysis can address it. Nothing in the present argument requires turning that inquiry into a theory of joint conceptual formation. The information carried by a record can be sufficient for a selected claim even where its social history is incompletely described.

The broader problem appears when the encounter changes what the response accomplishes or what the inquiry asks. If collaborators create a qualifier with a newly agreed documentary role, its later use can be accurate evidence of that present practice. Treating the result solely as error relative to a presumed unchanged antecedent convention would obscure the achievement. Likewise, an investigator who learns that factual accuracy and source standing answer different questions may appropriately revise the target rather than estimate a smaller error around the original classification.

A sufficiently rich measurement account can represent these changes too. It can include investigator learning, altered categories, intervention histories and current versus historical targets. The present paper makes no claim that those resources are exclusive to GR. Its proposed contribution is their explicit organization around an inquiry episode, using inherited historical carriers and formal distinctions to show where a particular inference succeeds or fails.

The field model illustrates this limited role. It gives one mechanism through which a response can persist after prompting. The algebra specifies whether a record supports an earlier target. Neither establishes that the mechanism occurs in a particular linguistic encounter. If a simpler account explains that encounter with adequate historical and interpretive scope, the framework permits it. Methodological adequacy follows the question and evidence, rather than the complexity of the available formalism.

## 12.3 Record Selection

A third objection concerns the freedom to choose the observation map. One can make identification fail by deleting a relevant feature, or make it succeed by defining the record to contain the target itself. Fibre criteria may then seem to formalize arbitrary decisions about what the investigator is allowed to know.

The mathematical dependence is real. A criterion for sufficiency should change when the record changes. The substantive issue is whether the selected map represents an actual retained and interpretable

resource. A hypothetical record containing the answer cannot establish that an investigator possesses such a record. Equally, a deliberately impoverished summary cannot establish the inadequacy of every archive. The construction becomes informative when its chosen record corresponds to a justified description of what the inquiry retained.

The caption example gives a concrete test. If the old catalogue preserves only final wording, the model should not include the earlier correction sequence merely because that sequence would identify the desired interpretation. If a recording of that sequence survives, the model should distinguish its material availability from the investigator's ability to read it. If the sequence is accessible only under restricted conditions, that limitation belongs to the practical access account. These are evidential claims about the inquiry's resources, not free mathematical conventions.

Choosing the candidate family has a parallel burden. Excluding every history in which instruction produces the later response would manufacture historical identification when such instruction is a live possibility. Including every logically imaginable history can erase useful distinctions supported by actual evidence. The account therefore requires a defended comparison range, with the restrictions and revision conditions visible. It does not promise a uniquely correct family derived without interpretive judgment.

The record need not be complete in an unrestricted sense. In an open-ended actual inquiry, retaining everything supplies no settled finite objective. Permission and relevance also require separate consideration. A defensible selection explains which distinctions bear on the claim and which omissions leave it vulnerable. The inherited trace analysis already makes sufficiency target-relative [10, Section 10]. The current application keeps the production and interpretation of that trace within the history being evaluated.

## 12.4 Formal Explanatory Value

The final objection challenges the formal apparatus itself. A finite information model and a familiar nonlinear response mechanism may describe selected possibilities while leaving the difficult philosophical judgments untouched. The mathematics could overwhelm the inquiry without resolving its central question.

The appropriate test is the difference a construction makes to an inference. The partial-domain result separates information supplied by an outcome from information supplied by selection into the encounter. The query-transport result preserves a historical claim that a stronger requirement of complete record translation would wrongly discard. The decoder comparison separates loss of information from a changed interpretation of unchanged codes. Each result identifies a particular premise or permits a more discriminating conclusion.

The field adds a mechanism that the record algebra alone leaves open. Persistent later alignment can result from an inquiry input, exact finite-time dynamics can remain injective while observational discrimination deteriorates, and unrecorded inputs can generate identical endpoints from different origins. These consequences are stronger than a general assertion that participation has effects. Their interpretation nevertheless depends on whether the chosen response law and observation model fit the case.

The constructions remain several possible models. Their use does not establish that inquiry is ultimately an operator algebra or that social understanding follows a quartic potential. A two-complex supplies a selected historical representation; a field law adds dynamic assumptions; an observable algebra adds an information structure. The relations among these layers require explicit interpretation. The paper's explanatory claim is proportionate when a reader can identify what each layer makes precise and what remains an empirical, historical or normative question.

If those distinctions do no work in an application, the apparatus should be reduced. If they expose a false inference or support a previously obscured partial finding, they earn their place. This criterion preserves the framework's exploratory character while giving its formal use an assessable purpose. The reporting proposal that follows turns those dependencies into a practical object whose adequacy can itself be examined.

## 13 Inquiry Reporting Architecture

A useful report makes the grounds of an attribution recoverable at a declared resolution. This section proposes a scoped architecture for that task. It connects a claim to its historical bearer, available evidence, relevant transformations, rival accounts and unresolved obligations. The architecture is evaluated through variants of the constructed caption inquiry in Section 10. It is a proposal for organizing reasons and provenance, with practical evaluation still required before it could serve as a validated documentation protocol.

### 13.1 Claim Records

The report should begin with the claim a reader is being asked to accept. In the caption inquiry, three candidates require different records: the editor used a source-standing distinction before the workshop; the investigator learned to apply that distinction during the workshop; and the collaborators formed a new shared qualifier. Presenting these as one general finding of preserved knowledge would leave the historical and practical objects unclear.

A workable claim record identifies the target, bearer, interval and relevant support arrangement in connected prose. For the investigator's learning, it can describe the initial task interpretation, the instruction received, the later contrast handled and the conditions of that performance. For the editor's earlier practice, it can identify the pre-workshop correction and explain how that record supports the selected attribution. For the new qualifier, it can identify its introduction, agreement about its intended use and the subsequent applications actually examined.

This organization need not duplicate the complete encounter for every claim. Shared sources can be referenced while their different roles are explained. One recording may document both the investigator's instruction and the qualifier's introduction. The report should make clear that the same evidence supports those claims through different aspects of the sequence. It should also identify whether a claim concerns the jointly supported arrangement or an individual contribution.

The specificity has a practical payoff. A later reader can challenge the dating of the earlier correction without thereby rejecting the evidence of present investigator learning. A disputed account of individual competence can leave the joint editorial achievement intact. The report supports selective revision because its claims retain the relations that justify them.

### 13.2 Access Provenance

The next task is to explain what the investigators could actually use. A source catalogue can list a recording, yet the decisive evidence may have come from an edited transcript, a participant's hearing of a passage or a later comparison with another document. The access history should distinguish those resources when the difference affects the inference.

Consider a variant in which the original recording survives but the first report used only a summary of accepted captions. After learning the source-standing distinction, the investigator returns to the recording and identifies a previously omitted correction. An adequate update connects the revised claim to the passage, the prior summary and the reason the new reading is defensible. Its epistemic gain lies in recovering a retained discriminator through an improved interpretation.

A second variant has only the summary. Here the same new competence can improve the investigator's questions while leaving the missing sequence unavailable. The report should preserve that result explicitly. It can identify the historical alternatives consistent with the summary and the kind of additional evidence that would bear on them. Recording the investigator's confidence as if it were a substitute for the lost sequence would obscure the actual evidential boundary.

Access provenance should also distinguish original evidence from repeated transmission. A participant's explanation copied into a catalogue and then quoted in a later report remains one connected source history. The several records can help establish how the explanation circulated; they do not automatically

become independent witnesses to its accuracy. Representing those links is more useful than accumulating an undifferentiated bibliography of favorable accounts.

### 13.3 Transformation Records

The reporting architecture should retain changes that alter how the evidence bears on the claim. Relevant changes can concern the task, materials, participant arrangement, supplied instruction, readout convention or historical criterion. Their importance follows from the inference; an exhaustive log of incidental actions would not necessarily improve it.

In the constructed inquiry, the investigator may initially code every rejected caption as factual disagreement. The later report separates factual support from source standing. The transformation record should state the old coding basis, the new basis and the grounds for the change. Where earlier items are recoded, it should identify whether the revised classification comes from retained evidence, new testimony or an explicit unresolved judgment.

The same requirement applies when a familiar code changes meaning. If an annotation originally records participant certainty and later records permission to attribute a statement, its visual continuity can be misleading. A reader needs the changed convention to compare the records. Preserving the old and new labels without preserving that relation would retain marks while losing an essential part of their interpretation.

Intervention content belongs beside readout revision. The report should distinguish a prompt that asks for an already available explanation from instructional material that supplies the contrast used in the subsequent answer. The distinction can remain uncertain. What matters is that the uncertainty attaches to the actual contribution and the claim it affects. The field investigation's input-history examples explain why a detailed endpoint alone cannot resolve an omitted intervention.

A feasible record can concentrate on consequential transitions. An annotated timeline, linked recording segments and a short account of criterion changes may be adequate for a bounded inquiry. More elaborate infrastructure needs justification through the dependencies it preserves and the work required to maintain it. The paper proposes those dependencies as design targets; it does not prescribe one software system or universal documentary format.

### 13.4 Restricted Evidence

Some evidence can remain unavailable to later readers even when it informed the investigation. The report should then distinguish the investigator's grounds from the publicly reproducible grounds. A claim supported by a restricted recording has a different public assessment structure from a claim whose decisive passage is accessible. Describing that difference accurately preserves the scope of criticism without assuming that disclosure is always appropriate.

Suppose the earlier correction includes material whose circulation has been limited. A report might identify the type of source, its date at an appropriate resolution and the narrower conclusion drawn, while explaining that the underlying passage is unavailable for open inspection. Whether an authorized independent review, a limited paraphrase or a weaker public claim is appropriate depends on the actual arrangement. These are possible responses to assess, rather than a rule that access restrictions can always be solved by mediation.

The record should also allow a decisive source to remain absent. If the supported public materials cannot distinguish antecedent understanding from later formation, the published claim may need to stop at the present achievement. A transparent statement of that limit can preserve useful knowledge without converting inaccessible evidence into an unchallengeable guarantee.

Restrictions themselves can change what is responsibly reportable. Even recording the existence or detailed structure of protected material may disclose more than an arrangement permits. The proposed architecture therefore treats provenance as a scoped obligation within justified access. Its objective is answerability at the appropriate level, with residual limits stated where they affect the claim. This appli-

cation inherits the condition-bearing trace's separation of provenance, known absences and restrictions [10, Section 9.2].

### 13.5 Practical Evaluation

The architecture should be evaluated by the inquiries it enables a reader to perform. In a first test, give a reader the endpoint caption and then the organized episode record. The comparison should reveal whether the fuller record supports a different or more differentiated judgment, such as present learned competence alongside unresolved antecedent understanding. The relevant outcome is the quality of the supported distinction, rather than agreement with the report's author.

A second test introduces a correction. Suppose a dated earlier example is later found to have been retrospectively annotated. A usable report should permit the historical claim to be reassessed without reconstructing every unrelated aspect of the workshop. Its source links and revision account should show which inference depended on the dating. The correction might weaken antecedent attribution while leaving the investigator-learning and new-qualifier claims supported.

A third test concerns burden and maintenance. If the record is so elaborate that participants cannot review consequential passages or later investigators cannot understand its dependencies, formal completeness has failed to produce practical answerability. Simplification should preserve the distinctions on which the selected claims depend. The resulting tradeoffs require experience with actual users and settings; the constructed examples identify what an evaluation should investigate without supplying its empirical results.

These tests also leave room for failure. A report can document an encounter carefully while its interpretation remains wrong. An accessible revision route can remain unused. A compact record can preserve one target and make a later unforeseen question unanswerable. The architecture's proposed value lies in enabling those limits to be located and criticized, while supporting the claims its evidence can bear. Assessing that value in implemented inquiry remains a subsequent research task.

## 14 Research Boundaries

This investigation has examined linguistic inquiry episodes in which participation can alter the evidence, the investigator's capacity to interpret it and the practice being investigated. Its primary object is the warrant of a specified attribution across those changes. The account connects a historical target, an accessible record, the encounter's transformations and reasons that discriminate live alternatives. It supports several kinds of finding while keeping their historical reach distinct.

### 14.1 Established Distinctions

A successful encounter can disclose a prior practical distinction, teach an investigator how to use it or help establish a new local convention. These contributions can coexist within one episode. The analysis therefore asks which contribution the evidence supports, at which time and for which bearer. Agreement on a final response is an achievement to explain. Its explanation may support understanding, deference, learning, shared formation or a combination whose components require separate grounds.

Records play a positive role throughout this account. A retained sequence can constrain a later reinterpretation, reveal a learning history and preserve a participant's disagreement. The acquisition of a new readout can make retained differences usable without changing the earlier event. Where the chosen record has merged a target-relevant distinction, however, a new vocabulary alone cannot recover the missing history. Target specification and record choice determine this limit; participation has no general epistemic priority independent of them.

The philosophical argument consequently requires both continuity and revision. A historical claim needs an intelligible connection to the earlier activity. A developing inquiry may need to revise the

categories through which that connection is investigated. The adequacy of a revision rests on its reasons, comparative success and acknowledged limits. Neither an unchanged label nor a participant's later acceptance can replace that assessment.

## 14.2 Conditional Formal Results

The history-bearing representation supplies carriers and anchors for comparing inquiry episodes. Its two-complex is one selected representation of their organization. The chain identity describes incidence; it does not establish equivalence between the meanings, effects or warrants of different interaction routes. A spin-foam instantiation would require additional algebraic and amplitude data that this inquiry does not supply.

Within the countable model, the operator results give conditions for transporting observables through a partial inquiry extension. The observables are functions of the selected records. Admissibility must itself be readable from the old record, and the selected output must respect the relevant old-record fibres. The quotient construction identifies the largest algebra of endpoint queries satisfying that compatibility condition. These are conditional mathematical results. The general transport and factorization architecture is inherited; its application here specifies the separation among historical anchoring, record sufficiency and practical query access.

The nonlinear graph field supplies further countermodels to unrestricted endpoint inference. A bounded input can change the attracting sector. Under specified conditions, common forcing contracts finite response differences. Yet exact finite-time evolution with known input remains injective. Missing input histories, coarse records and finite error must therefore be analyzed separately. None of these model results identifies an amplitude with linguistic meaning or establishes that a real encounter follows the stipulated law.

The field remains a finite regional representation with fixed channels during the selected episode. A changing inquiry can generate participants, distinctions and recording practices that require a different carrier. Extending the model would require rules for that change and explicit relations between the old and new observables. The present construction exposes this obligation without treating its finite graph as a complete generative theory.

## 14.3 Further Investigation

An empirical development would need to select a practice, obtain appropriate access and establish what its records support. Its comparisons should distinguish effects of prompting, interpretive learning and changes in the target activity. The constructed caption inquiry identifies possible comparisons; it neither validates a field protocol nor supplies observations about an actual language community. Measures of response and formal inputs would require an independent interpretation before any parameter estimation could be informative.

There is also a practical epistemology to investigate beyond the existence of formal decoders. An algebra of record-determined functions does not explain how an investigator acquires a usable interpretation. A richer account could examine training, collaborative correction, division of interpretive labor and the cost of maintaining access to earlier records. Such an account should preserve the difference between a function's mathematical availability and an agent's achieved competence.

The reporting proposal makes a narrower contribution. It offers a way to connect a finding to the episode that warrants it, including changes of target or readout and the limits of available provenance. Its usefulness needs assessment in actual inquiries. Documentation can clarify dependencies while remaining constrained by workload, permission and the legitimate refusal to disclose. The epistemic value of additional evidence does not by itself authorize its collection.

The preliminary result is a differentiated account of participatory linguistic evidence. Inquiry can preserve an earlier question, change its means of access and help form a present object of knowledge. Evaluating the resulting attribution requires making those relations explicit. Where the evidence

supports only part of the proposed history, the warranted finding retains that part and identifies the remaining question.

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